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A REVISION OF THE GENUS OGCODES LATREILLE WITH PARTICULAR REFERENCE TO SPECIES OF THE WESTERN HEMISPHERE

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Introduction

The cosmopolitan *Ogcodes* is the largest genus of the acrocerid or spider-parasite family. As the most highly evolved member of the subfamily Acrocerinae, I place it in the same general line of development as *Holops* Philippi, *Villalus* Cole, *Thersitomyia* Hunter, and a new South African genus.[2] *Ogcodes* is most closely associated with the latter two genera. The *Ogcodes* species have never been treated from a world point of view, and this probably accounts for the considerable confusion that exists in the literature. However, several large regional works have been published that were found useful: Cole (1919, Nearctic), Brunetti (1926, miscellaneous species of the world, mostly from Africa and Australia), Pleske (1930, Palaearctic), Sack (1936. Palaearctic), and Sabrosky (1944, 1948, Nearctic). Up to this time 97 specific names have been applied to species and subspecies of this genus. Of these, 19 were considered synonyms, hence 78 species were assumed valid. With the description of 14 new species and the addition of one new name while finding only five new synonyms,

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[2] This new genus, along with other new species and genera, is being described in forthcoming papers by the author.

we find there are now 88 world species and subspecies. Thus, the total number of known forms is increased by 16 percent.

The accumulation and study of some 2,500 specimens of this relatively rare genus revealed that in order for the author systematically to treat this large number of species, two new subgenera and six species groups had to be delimited. Besides using conventional morphological features to distinguish species, an attempt was made to use both wing venation and male genitalia. Both were found to be very useful.

A discussion of geographical distribution, phylogeny, and biology was prepared to understand more fully the relationships of this cosmopolitan but rather homogeneous group of parasitic flies.

Acknowledgments

Without the help of numerous persons a study of this sort would have been difficult, if possible at all. I especially want to extend my sincere appreciation to Mr. Curtis W. Sabrosky of the U.S. Department of Agriculture, Washington, D.C., for his constant help and advice on the many problems of this project; Dr. Richard M. Bohart of the University of California, Davis, for his inspiration and advice and for reviewing the manuscript; and Dr. Willis J. Gertsch of the American Museum of Natural History, New York, for determining the host spiders of these flies.

Appreciation is expressed to the many persons who have aided in the collection of the acrocerids and to the following people and institutions for the loan of the important collections on which this study was based. (The abbreviations in the following list are used throughout the text to denote the location of specimens studied.)

ALM: A. L. Melander collection, Riverside, Calif. (A. L. Melander).
AMNH: American Museum of Natural History, New York, N.Y. (M. A. Cazier and C. H. Curran).
BMNH: British Museum of Natural History, London, England (H. Oldroyd).
BYU: Brigham Young University, Provo, Utah (V. M. Tanner).
CAES: Connecticut Agricultural Experiment Station, New Haven, Conn., (C. L. Remington).
CAM: Colorado Agricultural and Mechanical College, Fort Collins, Colo. (T. O. Thatcher).
CAS: California Academy of Sciences, San Francisco, Calif. (E. L. Kessel and E. S. Ross).
CDM: C. D. MacNeill collection, Berkeley, Calif. (C. D. MacNeill).
CHM: C. H. Martin collection, Corvallis, Oreg. (C. H. Martin).
CI: Commonwealth Institute of Entomology, London, England (F. I. van Emden).
CIS: California Insect Survey Collection, University of California, Berkeley, Calif. (P. D. Hurd, Jr.).
CM: Carnegie Museum, Pittsburgh, Pa. (G. Wallace).

CMNH: Chicago Museum of Natural History, Chicago, Ill. (R. L. Wenzel).
CNM: Canadian National Museum, Ottawa, Canada (G. E. Shewell).
CPC: California Polytechnic College, San Luis Obispo, Calif. (H. E. Cott).
CSDA: California State Department of Agriculture, Sacramento, Calif. (H. H. Keifer).
CU: Cornell University, Ithaca, N.Y. (H. Dietrich).
DCB: D. C. Bullock collection, Angol, Chile (D. C. Bullock).
DEI: Deutches Entomologisches Institut, Berlin, Germany (W. Hennig).
EIS: E. I. Schlinger collection, Riverside, Calif.
FRC: F. R. Cole collection, University of California, Berkeley, Calif. (F. R. Cole).
GEB: G. E. Bohart collection, California Academy of Sciences, San Francisco, Calif. (E. L. Kessel and E. S. Ross).
GS: G. Steyskal collection, Grosse Ile, Mich. (G. Steyskal).
IE: Istituto di Entomologia, Bologna, Italy (E. Mellini).
INHM: Illinois Natural History Survey collection, Urbana, Ill. (H. H. Ross).
ISC: Iowa State College, Ames, Iowa (J. L. Laffoon).
JKW: J. K. Windsor collection, Los Angeles, Calif. (W. A. McDonald).
JP: J. Parks collection, St. Paul, Minn. (J. J. Parks).
LAM: Los Angeles County Museum, Los Angeles, Calif. (W. D. Pierce and E. G. Smyth).
LPG: L. Peña Guzman collection, Santiago, Chile (L. Peña Guzman).
MCZ: Museum of Comparative Zoology, Harvard University, Cambridge, Mass. (J. Bequaert and P. J. Darlington, Jr.).
MPM: Milwaukee Public Museum, Milwaukee, Wis. (K. W. MacArthur).
MSC: Michigan State College, East Lansing, Mich. (R. L. Fisher and H. King).
NCSC: North Carolina State College, Raleigh, N.C. (D. L. Wray).
NYSM: New York State Museum, Albany, N.Y. (J. A. Wilcox).
OAM: Oklahoma Agricultural and Mechanical College, Stillwater, Okla. (F. A. Fenton).
OSC: Oregon State College, Corvallis, Oreg. (F. F. Hasbrouck and V. Roth).
OSM: Ohio State Museum, Columbus, Ohio (J. N. Knull).
PANS: Philadelphia Academy of Natural Sciences, Philadelphia, Pa. (J. A. G. Rehn).
PHA: P. H. Arnaud collection, Washington, D.C. (P. H. Arnaud).
RCF: R. C. Froeschner collection, Ames, Iowa (R. C. Froeschner).
RHD: R. H. Dodge collection, Missoula, Mont. (R. H. Dodge).
RHP: R. H. Painter collection, Manhattan, Kans. (R. H. Painter).
RRD: R. R. Dreisbach collection, Midland, Mich. (R. R. Dreisbach).
SJP: S. J. Paramonov collection, Canberra, Australia (S. J. Paramonov).
SJS: San Jose State College, San Jose, Calif. (C. D. Duncan).
SNHM: San Diego Natural History Museum, San Diego, Calif. (C. F. Harbison).
SU: Stanford University, Palo Alto, Calif. (G. F. Ferris).
TF: T. Farr collection, Grand Rapids, Mich. (T. Farr).
TAM: Texas Agricultural and Mechanical College, College Station, Tex. (H. J. Reinhard).
UA: University of Arizona, Tucson, Ariz. (G. Butler and F. Werner).
UBC: University of British Columbia, Vancouver, Canada (G. J. Spencer).
UCA: University of California, Albany Insectary, Albany, Calif. (K. Hagen).

UCD:	University of California at Davis, Calif. (A. T. McClay).
UCLA:	University of California at Los Angeles, Calif. (W. A. McDonald).
UCR:	University of California at Riverside, Calif. (P. H. Timberlake).
UI:	University of Idaho, Moscow, Idaho (W. F. Barr).
UK:	University of Kansas, Lawrence, Kans. (R. H. Beamer).
U. Mass:	University of Massachusetts, Amherst, Mass. (C. P. Alexander).
UM:	University of Minnesota, Minneapolis, Minn. (E. F. Cook).
U. Miss:	University of Mississippi, University, Miss. (F. M. Hull).
UN:	University of Nebraska, Lincoln, Nebr. (L. W. Quate).
USAC:	Utah State Agricultural College, Logan, Utah (G. F. Knowlton).
USNM:	U.S. National Museum, Washington, D.C. (C. W. Sabrosky).
UT:	University of Tennessee, Knoxville, Tenn. (H. Howden).
UU:	University of Utah, Salt Lake City, Utah (G. F. Edmunds, Jr.).
UW:	University of Wisconsin, Madison, Wis. (C. L. Fluke).
VNM:	Naturhistorisches Museum, Vienna, Austria (M. Beier).
WCB:	W. C. Bentinck collection, Berkeley, Calif. (W. C. Bentinck).
WSC:	Washington State College, Pullman, Wash. (M. T. James).
ZI:	Zoologisches Institut, Berlin, Germany (F. Peus).
ZSI:	Zoological Survey of India collection, Calcutta, India (A. P. Kapur).

Methods

It was found desirable to prepare permanent slide mounts of the male genitalia, since other preservative methods were nearly as much work and were much less permanent. Such methods as placing the genitalia on card points or attaching them to the pin in small vials containing glycerine were discarded in favor of slide mounts when it was discovered that the solvent "Cellosolve" would rapidly dissolve many-year-old balsam mounts, even though they had been prehardened in a hot oven.

To dissect out the male genitalia the specimen is relaxed (after first removing all printed labels) in a petri dish containing distilled water and carbolic acid (to prevent molds). Rapid relaxing can be obtained by placing the petri dish under a light for 30 minutes or more. The specimen is then removed, turned venter up, and the head of the pin is inserted into a pinning block to a point where the dorsum of the specimen just touches the block. Using delicate forceps in one hand to hold the lateral tip of the abdomen, and inserting a small, sharply curved, minuten pin into the intersegmental membranes around the genitalia with the other hand, the genitalia can be eased out without extra injury to the specimen. The genitalia are then placed in distilled water, examined to see if all the parts were removed, and then placed in a 10 percent solution of potassium hydroxide (KOH). After warming for 5 to 15 minutes in this solution, the genitalia are removed and again placed in distilled water. At this time the parts are dissected and transferred into 70 percent

alcohol and the dissection is completed. After about 10 minutes the genitalia are placed in Cellosolve for not longer than 30 seconds, after which the parts are mounted in balsam. Cover slips need not be added until after the study of the parts is completed (perhaps an hour, week, month, or even years), since whenever a reexamination of the genitalia is desired all that is required is a drop of Cellosolve applied to the top of the balsam, and in a short time a minuten may be inserted and the parts rotated to the desired position for studying or illustrating.

The first-instar larvae were prepared in about the same manner as the genitalia, but for quicker, clearer, less distorted mounts, Berlese fluid was used in place of balsam. Larvae can either be killed first in alcohol or mounted alive in the Berlese fluid. In either method good mounts can be achieved only when the cover slips are applied immediately and pressed firmly to flatten out the larvae. A small amount of heat applied underneath the slide quickly hardens the Berlese fluid and flattens out the larva to a more desirable mount.

The maps were made by first plotting the distribution of the species with black dots made with a drop-pen. After delimiting the area believed to be occupied, or believed able to support the species, the Zipatone overlay was applied. The paraffin base of the Zipatone allows for fast, sure attachment to the map surface. The Zipatone is then cut along the desired margin with a scribe. The distribution maps of Nearctic species were prepared with the help of certain records cited by Sabrosky (1944, 1948). All illustrations of morphological structures were made with the aid of microscopes and a camera lucida. All figures are greatly enlarged, particularly those of the male genitalia.

In order to rear adult parasites from their hosts, live spiders were collected from suitable localities thought to have parasites present. The spiders were brought into the laboratory, placed in individual vials, and fed with any available insect food. In time, either the host matured or a parasite larva emerged. Mature spiders rarely yield any parasites; therefore, when collecting spiders in an attempt to rear parasites, one should be careful to select the immature forms.

First-instar larvae were obtained by collecting live adult female flies and placing them in large jars. Although eggs are not easily deposited by species of many genera of acrocerids, *Ogcodes* species usually do so with apparent ease. The eggs are then placed in a petri dish containing a piece of wet blotting paper, and in several weeks the young larvae usually appear.

Geographical Distribution [3]

Ogcodes is a cosmopolitan genus comprising 88 species and subspecies. These forms are found in the various regions as follows: Australian, 23; Ethiopian, 12; Nearctic, 18; Neotropical, 9; Oriental, 10; Palaearctic, 19; Polynesian, 3. There are several important areas where *Ogcodes* species have either not been collected or where they have been unable to reach and adapt. As shown in text figure 1, species are absent from such islands as Madagascar, West Indies, Greenland, Iceland, Ireland (?), Canaries, Sumatra, Borneo, Celebes, New Guinea, Formosa, Hawaii, and apparently all the smaller mid-oceanic islands, as well as from most land areas north of the Arctic Circle and south of the Antarctic Circle. That *Ogcodes* species have not been barred from adapting themselves to island faunas is attested by the fact that they occur in England, Ceylon, Java, New Zealand, Tasmania, the Philippines, and Juan Fernandez Islands. Besides *Ogcodes* species not populating certain islands, they are apparently satisfactorily barred from all the major desert regions of the world.

The great majority of species are restricted to a single region. Notable exceptions are *Ogcodes guttatus* Costa, which inhabits the Ethiopian, Oriental and Palaearctic regions, and *O. dispar* (Macquart) and *O. pallidipennis* Loew, which occur both in the Nearctic and Neotropical regions. Although there are no known truly Holarctic species, *O. eugonatus* Loew, *O. melampus* Loew [both Nearctic], *O. nigripes* (Zetterstedt), and *O. zonatus* Erichson [both Palaearctic], are extremely closely related (see discussion under the Nearctic species). A further complication of this association is the fact that *O. caffer* Loew from the southern Ethiopian region is also very similar.

Of the three subgenera recognized, only *Ogcodes* Latreille is cosmopolitan. *Neogcodes,* new subgenus, is restricted to the Nearctic subregion and *Protogcodes,* new subgenus, is an Australian endemic.

Concerning the subgenus *Ogcodes,* which contains 86 of the 88 species, I found considerable specific morphological evidence that aided me in determining the geographical relationships of the species. This was most easily accomplished through studying the six species groups (p. 249).

The *pallidipennis* group is widespread, occurring in all areas except the New Zealand subregion. It appears to be most common, however, in the Holarctic, Oriental and Australian regions, having apparently never reached New Zealand, and is not very common in the Ethiopian region.

The *colei* group is also widespread but in a much more restricted

[3] The divisions of geographical regions adopted here follow that outlined by Beaufort (1951) for the most part. I have, however, made subregions out of his Australian, New Zealand, and Oceanic Islands regions and changed the last-named region to Polynesian subregion.

pattern. Species of this group are known only from the Nearctic subregion, Chile, Iran, New Zealand and Tasmania. The relationships of species between New Zealand and the United States is surprisingly close, as nearly every species in the one area has a counterspecies in the other. One species is known from the Palaearctic subregion, so it is probable that species of this group will be found to inhabit the Oriental region as well.

The *eugonatus* group, though much more restricted, has a distribution similar to that of the *pallidipennis* group. Representatives are known from the Holarctic, Ethiopian, and southern Neotropical regions.

The *brunneus* group is endemic to New Zealand.

The *borealis* group is Holarctic. It seems probable that it had a much greater distribution in the past, as based on the present day relationships, through members of the *colei* group.

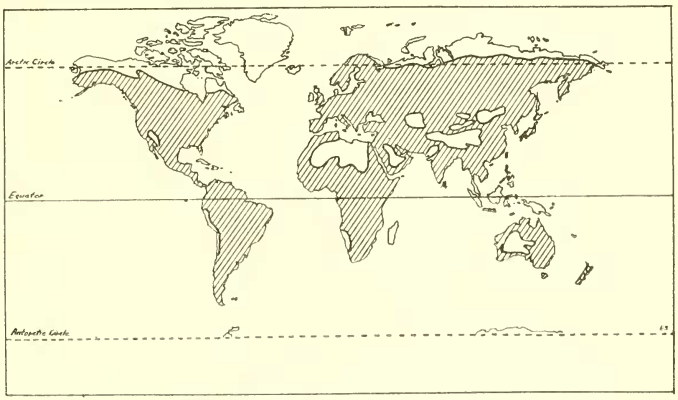

FIGURE 1.—Distribution of the genus *Ogcodes* in the world.

The *porteri* group is a Chilean endemic which likely will remain so due to the strong geographical barriers present, just as is the case for so many animal species occurring there.

It seems advantageous here to discuss species distribution on a regional basis as well, since there appear to be definite trends of relationships appearing for the first time. The 23 Australian species are divided into 11 from Australia, 6 from Tasmania, and 7 from New Zealand. Only one species occurs in any two of the areas, that being *Ogcodes fortnumi* Westwood, which is now known from Tasmania and Australia. *O. basalis* (Walker) may be found to occur in Tasmania, since it is a common species in Australia (see discussion under *basalis*).

As mentioned earlier the relationship of the New Zealand species is with the Nearctic species, there being no observable association with Australian species. There is a somewhat more pronounced general comparison between types of species in Tasmania and New Zealand than between the latter and Australia. The Australian species (through *O. basalis*) show a definite correlation to the Polynesian, Oriental and Palaearctic regions. The Polynesian species, of which there are only 3, exhibit an apparent transition between the Australian and Oriental regions. The Oriental region has 10 species, of which 9 are endemic. *O. guttatus*, the one nonendemic species, reaches into the southern Palaearctic and southern Ethiopian regions. For the most part, species of this region tend to merge into those of the Polynesian and Australian regions.

The Neotropical region contains 9 species, 2 of which are northern and occur more commonly in the southern Nearctic subregion. The other species exhibit rather definite and interesting relationships, some being affiliated with those of Tasmania and New Zealand, some with the Nearctic area, others with the Palaearctic area, while still others are strictly endemic and unrelated. The Holarctic region contains 37 species, nearly one-half of the total world species. These are evenly separated in 18 Nearctic and 19 Palaearctic species. The Holarctic correlation was mentioned above. Species of the Nearctic subregion show affiliation with all regions except the Oriental and Polynesian and show little endemicity. Those of the Palaearctic subregion likewise connect with many other regions, the only noticeable exception being the New Zealand subregion. There is also little endemicity shown for species of this region.

The other subgenera of *Ogcodes* are both monotypic. *Neogcodes* is Nearctic and related to Nearctic species, while *Protogcodes* is Australian and associated only with Australian species.

General considerations: This study of *Ogcodes* species has shown that the species groups have wide general distributions, most of them covering two or more geographical regions. Endemicity occurs in each area, but it is more common in the southern temperate faunas. Islandic populations occur throughout the world; however, many other insect-populated islands do not harbor *Ogcodes* species. The great deserts of the world appear to have formed a permanent barrier to these species, just as the colder limits of the Arctic and Antarctic Circles have formed impediments. And yet, apparently only one other acrocerid genus, *Acrocera*, appears to inhabit the Arctic climate with *Ogcodes*. There appear to be no pantropical or circumpolar distributional patterns in *Ogcodes*.

My studies would seem to indicate that both Holarctic and Australian-Nearctic-Neotropical distributions have occurred through the

Northwest Passage between Siberia and Alaska. There appears to be no evidence for assuming the presence of a one-time Antarctic land bridge to explain this distribution as has been the case with some other authors confronted with similar distribution problems. Species of the Australian-Nearctic-Neotropical distribution pattern have maintained a temperate, discontinuous distribution, and no doubt representatives of this group will be found to occur in China and other temperate East Asian countries. A similar cross-continent temperate distribution pattern occurs between the Nearctic, Palaearctic and Ethiopian regions.

From the evidence at hand it seems that the genus *Ogcodes* is best adapted to the temperate areas, both in numbers and species. However, further collecting in tropical areas may show them to be equally well inhabited. For further notes on distribution see the discussions under the various species in the text.

Phylogeny

Because many of the world species were not available for study, and because their descriptions did not contain the essential features necessary to account for their phylogenetic position, the phylogeny presented herein is obviously preliminary with the possible exception of the Nearctic fauna. Text figure 2 shows the probable relationships based on the species studied, which represented about 60 percent of those now known. No doubt other subgenera and species groups may have to be set up at a later date, but at least an account of our present knowledge of the genus can now be shown with some degree of certainty.

A new South African genus appears to be the last traceable ancestor of the highly evolved genus *Ogcodes*. Since this undescribed genus possesses such features as a distinct proboscis, strong wing venation, and hairy eyes, it probably gave rise indirectly to the monotypic Chilean genus *Thersitomyia* Hunter, which, according to its original author (Philippi, 1871, as *Thersites*), was very similar to *Ogcodes* except in having hairy eyes.

Of the subgenera of *Ogcodes*, the new subgenus *Protogcodes* seems to retain the most primitive characters, such as stronger wing venation and more styliform antenna with a basal bristle, and judging from the relationship of *O. brunneus* (Hutton) with *O.* (*P.*) *paramonovi*, new species, I have assumed that the *brunneus* group is the most primitive one of the subgenus *Ogcodes*. There is little doubt that the *eugonatus* group originated from that of *brunneus*, and simply lost vein M_1 and crossvein m-cu. Just where the *borealis* group originated is questionable, but the presence of vein M_1 and crossvein m-cu, and male genitalia of the *brunneus-eugonatus* types as well as exemplifying

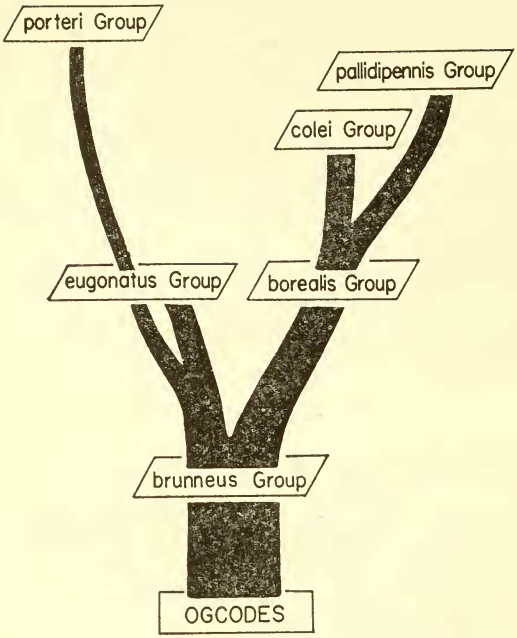

FIGURE 2.—Phylogenetic tree of *Ogcodes* species groups.

features of both the *pallidipennis* and *colei* groups, accounts for my placing it as ancestral to the two last-named groups. The species of the *pallidipennis* group have all retained vein M_1 but have lost crossvein m-cu, and have developed stronger, well-built male genitalia. Members of the *colei* group have retained (or lost) one or both of the wing veins, and have, for the most part, much-reduced male genitalia. From the *colei* group in the Nearctic region arose the monotypic subgenus *Neogcodes*, judging from its more reduced wing venation, male genitalia, loss of the antennal style, and the subsequent reduction in size of the terminal antennal segment. The *porteri* group has greatly reduced wing venation, but because the monotypic species is known from only one specimen, which did not possess antennae and whose male genitalia could not be examined, its placement and rank are both questionable. However, judging from the known distribution and wing venation, it probably represents a highly evolved group which was derived from a Chilean species of the *eugonatus* group.

In the phylogenetic tree for the Nearctic species (text fig. 3), only

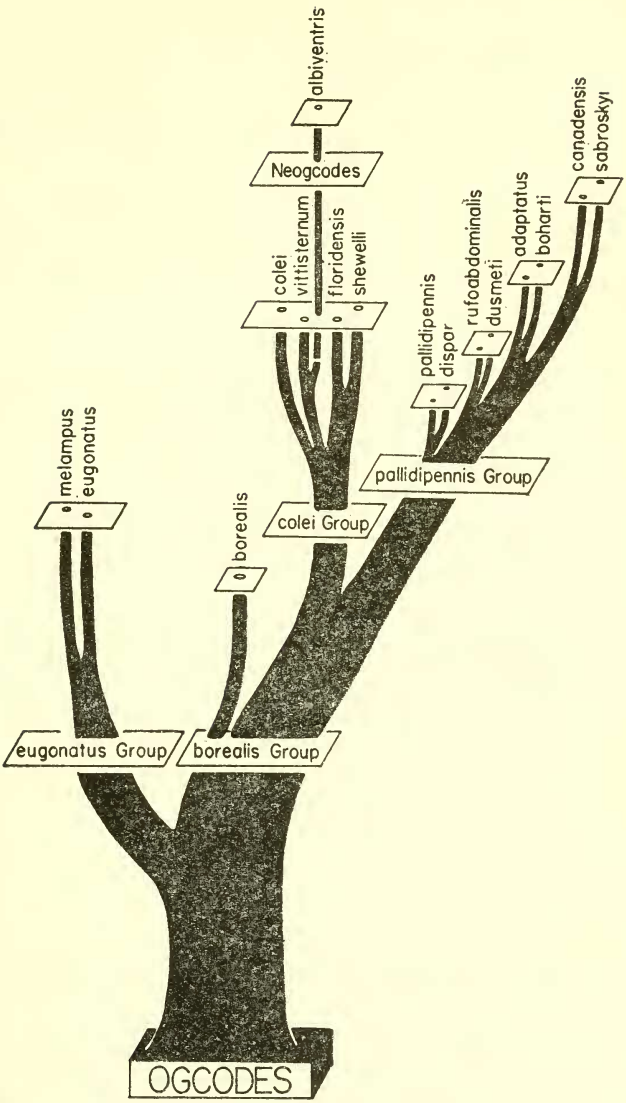

FIGURE 3.—Phylogenetic tree of Nearctic *Ogcodes* species. The species *niger* and *hennigi* have been omitted (see discussion, pp. 287, 305).

the correct placements of *niger* Cole and *hennigi*, new species, seem somewhat dubious. The richness of the fauna of this region is shown by the presence of two of the three subgenera, and four of the six species groups now recognized for the world. The *pallidipennis* group predominates, with *sabroskyi*, new species, being the most highly developed member. The four species of the *colei* group are all closely related but actually represent two different stocks. In certain features, *vittisternum* Sabrosky is quite similar to *floridensis* Sabrosky, while *colei* Sabrosky is likewise somewhat similar to *shewelli* Sabrosky, hence their position on the tree. The close approximation of *melampus* Loew and *eugonatus* Loew is due to the possibility of their being conspecific (see discussion, p. 279).

Biology

Although acrocerid biology as a whole is scarce, more work has been done on *Ogcodes* than all other genera put together. All known species are solitary internal parasites of true spiders (Araneae) during their larval stages. Since biological observations have been summarized recently by Millot (1938), Clausen (1940), and Plomley (1947b), a general outline sketch of my observations on several species is all that seems to be required at this time. For further notes on the habits of the particular species, see the discussion under the appropriate species in the text.

There are about 30 known host-parasite relationships for the genus *Ogcodes*. Although most of the common hosts belong to the spider family Lycosidae, the following families are also recorded as hosts: Amaurobidae, Salticidae, Psechridae, Thomosidae, Anyphaenidae, Clubionidae, Gnaphosidae, Agelenidae, and Theridiidae. For a complete list of host-parasite relationships see table 1.

Stein (1849) was the first person to observe the habits of these flies. Following him, the more important contributions were made by Gerstaecker (1856), Maskell (1888), Giard (1894), Konig (1894), Bovey (1936), Kaston (1937), Millot (1938), Dumbleton (1940), Clausen (1940, summary only), Plomley (1947b), and Kessel (1948). Of these works, those of Millot, Dumbleton, and Plomley are outstanding.

Oviposition: In all observed species, eggs are laid in great numbers, as many as 3,000 having been recorded for a single female during a four-hour period. They are deposited singly, varying with the species and time of day, from one every five seconds to about one every minute. They are almost always laid on or near the apices of dead twigs, and only rarely can they be found on growing plant parts. Usually, females are found congregated on a twig, laying their eggs

TABLE 1.—*Summary of the known host-parasite records of the genus* Ogcodes

(This table includes all new records cited in this paper. The names of the parasites conform to the present status, but the host names have not been corrected or changed since the publication of the record.)

Species	*Host spider*	*Locality*	*Authority*
adaptatus, new sp.	*Pardosa sternalis* Thorell (?)	California, U.S.A.	New record.
	Philodromus sp.	California, U.S.A.	New record.
	Hololena curta McCook (?)	California, U.S.A.	New record.
borealis Cole	*Xysticus montanensis* Keyserling.	California, U.S.A.	New record.
	Anyphanella saltabunda Hentz	New Jersey, U.S.A.	Sabrosky (1948).
brunneus (Hutton)	*Matachia ramulicola* Dalmas	New Zealand	Dumbleton (1940).
doddi Wandolleck	*Cosmophasis bitaeniata* Keyserling.	Australia	Dodd (1906).
eugonatus Loew	*Pardosa distincta* (Blackwall)	Ontario, Canada	Sabrosky (1948).
	Pardosa banksi Chamberlin	Connecticut, U.S.A.	Kaston (1937).
	Pardosa sternalis Thorell (?)	California, U.S.A.	New record.
gibbosus (Linnaeus)	*Prosthesima* or *Zelotes* sp.	Denmark	Nielsen (1932).
	Prosthesima sp.	Denmark	Nielsen (1932).
	Trochosa sp.	England	Locket (1939).
melampus Loew	*Tarentula kochi* Keyserling	California, U.S.A.	New record.
	Xysticus cunctator Thorell	California, U.S.A.	New record.
pallidipennis Loew	*Herphyllus* sp.	California, U.S.A.	New record.
	Hololena curta McCook	California, U.S.A.	New record.
	Walmus sp.	California, U.S.A.	New record.
	Steatoda palomara Chamberlin and Ivie	California, U.S.A.	New record.
	Pardosa saxatilis (Hentz)	Connecticut, U.S.A.	Kaston (1937).
	Lycosa sp.	Connecticut, U.S.A.	Kaston (1937).
pallipes Latreille	*Xysticus luctuosus* Blackwall	Poland	Trojan (1956).
	Clubiona putris Koch		Menge (1866).
	Clubiona sp.		Giard (1894).
	Tarentula barbipes Walckenaer	England	Locket (1930).
	Phlegra fasciata Hahn	France	Millot (1938).
	Heliophanus sp.	Pyrenees	Millot (1938).
	Lycosa pullata Clerck	England	Locket (1939).
	Aelurillus insignitus Clerck	Pyrenees	Millot (1938).
varius Latreille	*Aelurillus insignitus* Clerck	France	Séguy (1926).
zonatus Erichson	*Heliophanus* sp.	Pyrenees	Millot (1938).

while walking either up or down the substrate. At times they appear to be so preoccupied that I have seen them laying eggs on the legs of other adults which have inadvertently gotten in the way while pausing to rest. The eggs are deposited without regard to the presence of suitable hosts, but, in most cases observed, the females do not fly far from their emergence site, and thus hosts would presumably be available to the larvae. The incubation period has been reported as being

from two to five weeks, depending upon external conditions of which humidity and temperature are the most important factors.

Egg: Dull brown to black, somewhat pear-shaped, finely reticulated, and quite small, rarely exceeding 0.35 mm. in length. Millot (1938) referred to an adhesive disc on the posterior end of the egg of *pallipes* Latreille which was used for its attachment. However, in *adaptatus*, new species, the disc is apparently wanting, and the eggs when laid seem to be sticky over the entire surface so as to adhere to the substrate at nearly any angle.

First-instar larva: The planidial larvae upon emergence may be seen "standing" erect beside the egg, and are ready in this position to attach themselves to any host which may pass by. There may be several days of this "standing" or "walking," the latter being done by bending the head down to the surface and moving the caudal segment forward in a fashion similar to that of a measuring-worm. If the larva does not come in contact with a suitable host, it may drop from the substrate to the ground or jump from place to place by springing itself into the air. I have observed that, upon contact with a host spider, the larva appears to be careful not to disturb it and moves only when the spider itself moves. At times a spider has been observed to remain quiet for hours, and during this period the *Ogcodes* larva has done likewise.

In most cases that I have seen, the larvae seemed to prefer entering the host along the dorsal-median-anterior region of the abdomen; and the total length of time involved to complete the parasite entrance was from 1 to 24 hours for *adaptatus*, new species. Several larvae were observed to enter the host through the intersegmental membranes of the legs, but about 50 percent of the larvae moved over the host's body and entered the abdomen as above, even when their primary attachment to the host was some distance from the abdomen. In my experiments active larvae of *adaptatus*, new species, have lived up to 10 days, but the average longevity was only 6 days. For other information on larval habits see Clausen (1940).

The first-instar larva (pl. 2, figs. 4, 5), which is best termed a planidium, is composed of 12 segments (the head and 11 somites), each well-sclerotized, and, except for the head segment, bearing various numbers and lengths of strong or weak setae. The larva measures about 0.30 mm. in length, and about 0.05 mm. in width. The head is minute and consists of a pair of anterior oral hooks, a pair of small dorsal setae, and a pair of apparently two-segmented, ventral antennae, each with a short distal seta. The mouth is just anterior to the point of antennal insertion. The buccopharyngeal armature consists either of two dorsolateral rods and one medioventral rod or two dorsolateral and two ventrolateral rods that extend back from the

articulation of the oral hooks. The differences in the formation of this structure appear to be specific among the species which have been figured, such as *brunneus* (Hutton) by Dumbleton (1940), *pallipes* Latreille by Millot (1938), and *adaptatus*, new species, as figured in this work. The chaetotaxy of the known species also appears to be specific. Each tergite usually has a row of setae along the posterior margin, while each sternite has several rows and various types of setae. The caudal segment bears one large, anterior, dorsal pair of setae, as well as several short setae, hooks, and a sucking disc at the apex. The single pair of spiracles are dorsal, posterior, and are located on a separate sclerite between segments XI and XII. The tracheae are quite straight, one to each spiracle, running nearly into the head segment. They are joined only once, just anterior to the spiracles. For further notes on the larvae see the references cited above.

Mature or third-instar larva: After the first-instar larva becomes attached inside the host, a period of time passes (varying apparently with the growth rate of the spider which is between 6 and 9 months) during which there are two molts. The third-instar larva develops rapidly, consumes most of the host contents, makes an exit hole along the epigastric furrow of the spider and emerges posteriorly. The larva is sticky on the surface and adheres, ventral side up, to the spider webbing, which is made just prior to the emergence of the parasite.

The third-instar larva is whitish and measures from 5.0 to 12.0 mm. in length. It has a small, yellowish white head, a distinct, yellow, barely segmented thorax bearing a pair of prothoracic spiracles, and a large abdomen of 9 apparent segments. The precaudal and caudal segments are somewhat restricted, and bear a pair of dorsal spiracles. The larva pupates in 1 to 3 days after emergence.

Pupa: Pupation occurs outside, but usually quite near the host's body. A distinctly coiled, dark brown to black meconium is passed as the prepupa is formed. The duration of the pupal period varies from 2 to 10 days, during which time the pupa becomes increasingly darker until just before adult emergence, when it is nearly black.

The pupa (pl. 1, fig. 1) is adult-like, having an obvious head, thorax, and abdomen, the whole of which measures from 4.0 to 10.0 mm. in length. The head has a curving row of papilliform protuberances on each side. There are prothoracic spiracles, and spiracles on abdominal segments II–V (sometimes referred to as I–IV). There are 9 visible abdominal segments, the first and last three of which are not separated into tergites and sternites. The scutellum is an obvious protrusion when viewed laterally.

Host: Most of the Nearctic hosts are of the family Lycosidae or wolf-spiders. (For a complete host-parasite list, see table 1.)

The spider is usually killed prior to maturity and most often while in the penultimate instar. As has been observed by Locket (1930) and Schlinger (1952, for *Opsebius*), the spider spins a thin cell-like web just prior to its death, the web inadvertently acting to protect the maturing parasite. This web is similar, if not identical, to that spun by the spider prior to molting. The parasite larva is not discernible until about three hours before its emergence from the host, when close examination reveals the rapidly moving mouthparts which indicate consumption of the host. The host skeleton can usually be found just beneath the maturing parasite (pl. 1, fig. 1).

For this study, 45 specimens representing 5 species of *Ogcodes* have been reared from California spiders during the past 10 years. The hosts belonged to 9 species in 5 families, most of which were either Lycosidae or Agelenidae. Although there appears to be no definite host-parasite association, the fact remains that *Ogcodes* species, as well as all the recorded species of the subfamily Acrocerinae, are known only as parasites of the spider suborder Labidognatha. This compares well with the fact that acrocerids of the subfamily Panopinae are known to be parasitic on spiders of another suborder, the Orthognatha. No host data are available for the other acrocerid subfamily, the Philopotinae.

Adult habits: The adults are often encountered in great numbers by sweeping wet grassy areas such as meadows or grass-covered orchards, or by picking them up by hand from the dead branches where the females are depositing their eggs. For the most part the females are quite sluggish, primarily because of their gravid condition at emergence. The males, however, are much more active, and at times are difficult to catch even with a net. Mating usually occurs in flight, where, upon contact, the couple drops to the ground or onto a nearby bush to complete the process. If disturbed during mating, they may take flight, at which time they are easy to collect. Almost immediately after mating the female may begin to deposit eggs, thus showing that there is little if any time factor restricting the oviposition or fertilization processes after mating takes place.

The adult longevity periods for the known species under caged conditions vary from 3 to 12 days, with 3 to 4 weeks probably being the maximum span in nature. Apparently the adults take no food, and although it is possible that they obtain moisture through their oral membrane, no evidence has been found of their feeding on water, sugar-water, honey, flowers, or several nutrient solutions given them under caged conditions. (For more detailed results of adult habits and host-parasite relationships, see the discussions under *adaptatus*, new species, *borealis* Cole, *eugonatus* Loew, *melampus* Loew, and *pallidipennis* Loew.)

Predators and parasites: During the years of collecting acrocerids, I have observed several predators engaged in feeding on *Ogcodes* adults or their eggs. Feeding on the adults were spiders of the genera *Dictyna*, *Pardosa*, *Tetragnatha*, and *Xysticus*, an adult nabid (probably of the species *Nabis ferus*), an adult reduviid, and crabronids of the genus *Ectemnius*. Crabronids have been recorded in Europe as storing their nests with adult *Ogcodes*, while new crabronid-acrocerid associations and a summary of all available records of these relationships have recently been given by Bechtel and Schlinger (1957). The only egg predator seen was an adult raphidid, which was consuming considerable amounts of *O. adaptatus* eggs that had been deposited in large numbers on the dead twigs of *Artemisia* species.

I am not aware of any record of parasites of the late larval or pupal stages of *Ogcodes;* however, it seems quite probable that species of some hymenopterous families (such as the Pteromalidae) may be found to parasitize these flies.

Morphology

Male genitalia: For the sake of uniformity, the terminology used here follows mainly that of Sabrosky (1948). Since the genitalia of all species examined offered good to excellent specific distinctions, it is unfortunate that earlier and some present-day workers have neglected the use of specific characters, even though Wandolleck (1914) and Cole (1927) both have pointed out through illustrations that distinct differences existed among the various species. Plomley (1947a) described and figured the genitalia of *Ogcodes pygmaeus* (as *O. basalis*), but he did not attempt to differentiate any other species by using these structures. Sabrosky (1948) was actually the first to fully investigate the usefulness of male genitalia as specific characters, and his work formed the basis for the present interpretations. The genitalia (figured in pl. 6, fig. 31) consist of the following parts: Aedeagus, claspers, 9th tergite and cerci, 8th sternite, 8th tergite (not figured), and ejaculatory apodeme. All parts of the genitalia have morphological differences that distinguish the various species, but those exhibiting the most significant features are the aedeagus and the ejaculatory apodeme.

The aedeagus is a long rod-shaped organ, enlarged and sheathed basally. The sheath opens on the sides and becomes dorsal toward the apex. The ventral side is usually notched or angled either behind and/or beyond the seminal orifice (gonopore). These indentations are referred to as pregonoporal and postgonoporal notches, and it is this distal portion that has the definitive characteristics.

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There are three general types of ejaculatory apodemes shown in this genus. All these apodemes have a median plate, one or two median cells (basal and subbasal), and a pair of laterally extended wings (pl. 6, figs. 32, 33). As a rule, those species with a large median plate have large wings and those with smaller plates have smaller wings.

Sabrosky (1948) found four distinct types of genitalia in the Nearctic species of *Ogcodes*. These types were based primarily on the structure of the ejaculatory apodeme. These and other types are discussed below under the designated species groups of the subgenus *Ogcodes*.

Wing structures: Although the wing venation of this genus is relatively simple (pl. 3, figs. 6–13; pl. 4, figs. 14–21), and the veins at times difficult to ascertain, Sabrosky (1944, 1948) found that the presence or absence of vein M_1 was quite significant in distinguishing several named species that had been based mostly on color features. Because of this character he was able to establish considerable synonymy. He was able to show also the existence of a relationship between the venation and male genitalia, and he used these features as "species complex" characters. From my study of the genus it is evident that m-cu and r-m crossveins are equally important, and by using a combination of these and other veins it was found that not only were species groups evident but also that the species themselves for the most part could be identified by these features alone.

In an attempt to examine the venation more closely, wings of several species were mounted in balsam on slides, and it was found that short, sparse, stout hairs covered most of the costa, being more dense near the wing base, thinner near the tip, absent along the posterior margin, but again present to some extent along the anal margin. A few hairs were also observed on Sc, R_{4+5}, and M_4. Whether or not this characteristic is of any specific value will have to be determined by further study, but the presence of setae on the wing veins (as in several other acrocerid genera) and on the wing membrane (such as in certain species of *Ocnaea* Erichson and *Villalus* Cole) may be useful in studying evolutionary trends within the family.

Other characters: It was found that the structure of the antennae was quite variable within the genus, and antennae from several species were mounted on slides for study. The antennae of the species observed were found to be quite consistent for each species, and the number of apical setae on the terminal segment, the presence of a basal bristle on segment III, and the great reduction of segment III formed the basis for dividing *Ogcodes* into its three subgenera (pl. 5, figs. 23, 25, 27).

Another important specific character often overlooked is the type and amount of body pile. The length and placement of pile seems to be a fairly consistent group character in the subgenus *Ogcodes*.

Also, the color of the pile was found to be a reliable specific criterion within reasonable limits, but in any case the type of pilation should be noted in future descriptions. The color of the integument, as a specific character, although variable in some species, likewise was found to be reliable in the majority of those species examined.

Systematics

History: The genus *Ogcodes* was described by Latreille in 1796 but did not receive its type, *Musca gibbosa* Linnaeus, until 1802. Meigen (1804) discussed the genus under the name *Henops*, but this name was established by Illiger (1798) for *Syrphus gibbus* Fabricius, which is now the type species of *Cyrtus* Latreille. Meigen (1822) revised the genus *Ogcodes*, again under the name *Henops*, but at the same time suggested the emendation *Oncodes*, for *Ogcodes*. This emended spelling has been used at different times by many authors, but I agree with Sabrosky (1948, p. 408) in retaining the original orthography, although granting that *Oncodes* may be a better construction of the word.

Some of the more important contributions to the systematics of this genus were made by Meigen (1822), Erichson (1840), Gerstaecker (1856), Cole (1919), Brunetti (1926), Pleske (1930), Sack (1936), and Sabrosky (1944, 1945, 1948).

Genus *Ogcodes* Latreille

Ogcodes Latreille, Precis. Caract. Gen. Ins., p. 154, 1796; Hist. Nat. Crust. Ins., vol. 3, p. 432, 1802; Tabl. Method., *in* Nouv. Dict. d'Hist. Nat., vol. 24, p. 200, 1804.—Macquart, Hist. Nat. Ins. Dipt., vol. 1, p. 368, 1834.—Erichson, Entomographien, vol. 1, p. 169, 1840.—Gerstaecker, Stett. Ent. Zeit., vol. 27, p. 353, 1856.—Bigot, Ann. Soc. Ent. France, vol. 4, p. 89, 1856.—Schiner, Fauna Austriaca, vol. 1, p. 73, 1862.—Bigot, Ann. Soc. Ent. France, vol. 9, p. 319, 1889.—Wandolleck. Zoll. Anz., vol. 34, p. 549, 1909.—Coquillett, Proc. U.S. Nat. Mus., vol. 37, p. 578, 1910.—Wandolleck, Einl. Monog. Inflatae, pp. 4–30, 1914.—Cole, Trans. Amer. Ent. Soc., pp. 45–59, 1919.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 387, 1944; Amer. Mid. Nat., vol. 39, p. 408, 1948.

Henops Meigen, Klass. Beschreib, Europ. Zweiflug. Ins., vol. 1, p. 150, 1804; Syst. Beschreib. Bekannten Europ. Zweiflug. Ins., vol. 3, p. 98, 1822.—Zetterstedt, Ins. Lapponica (1838), p. 573, 1840.—Walker, List Dipt. Ins. Brit. Mus., pt. 6, supp. 2, p. 353, 1854 (not Illiger, 1798).

Oncodes Meigen, Syst. Beschreib. Bekannten Europ. Zweiflug. Ins., vol. 3, p. 99, 1822.—Verrall, Stratiomyidae etc., Dipt. Brachy. Great Britain, vol. 5, p. 461, 1909.—White, Pap. Proc. Roy. Soc. Tasmania for 1914, p. 69, 1915.—Hardy, Pap. Proc. Roy. Soc. Tasmania for 1921, p. 77, 1922.—Sèguy, Fauna de France, vol. 13, p. 166, 1926.—Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 590, 1926.—Pleske, Konowia, vol. 9, p. 163, 1930.—Sack, Die Fliegen, vol. 98, p. 15, 1936.—Millot, Bull. Soc. Zool. France, vol. 63, p. 162, 1938.—Hardy, Proc. Linn. Soc. New South Wales, vol. 45, p. 486, 1940.—Plomley,

Rec. Queen Victoria Mus., vol. 2, p. 17, 1947a; Rec. Queen Victoria Mus., vol. 2, p. 23, 1947b.—Hennig, Die Larvenformen Dipt., vol. 3, p. 91, 1952.—Paramonov, Pac. Sci., vol. 9, p. 23, 1955.—Trojan, Ann. Zool., vol. 16, p. 75, 1956.

Ogeodes, Gimmerthal, Bull. Soc. Imp. Nat. Mos., p. 167, 1847.—Schlinger, Wasm Journ. Biol., vol. 11, p. 320, 1953 (lapsus).

Ogkodes, Schiner, Verh. Zool.-Bot. Ges. Wein., vol. 15, p. 89, 1865.—Hennig, Die Larvenformen Dipt., vol. 3, p. 624, 1952 (lapsus).

Arcrodes, Froggatt, Australian Ins., p. 298, 1907 (lapsus).

TYPE OF GENUS: *Musca gibbosa* Linnaeus as *Syrphus gibbosus* Fabricius (by subsequent designation of Latreille, 1802, p. 432, one species).

GENERIC DIAGNOSIS:[5] Small to medium-sized (2.5–10 mm.), gibbose, typically black or brown with yellow or white posterior fasciae on tergites (pl. 5, fig. 29), somewhat more irregular on sternites, or varicolored brown or black with white, yellow, or orange markings (pl. 5, fig. 30); pile present over most of specimen, long or short.

Head with bare holoptic eyes in both sexes (pl. 5, fig. 28); antenna 3-segmented, inserted just above mouth, segment I round and short, segment II of equal or slightly larger size, with or without short bristle, segment III styliform with single lateral sensory pit, with one to three short apical setae and with basal bristle, or short and blunt with five to six longer apical setae (pl. 5, figs. 23, 25, 27); proboscis present in living or dead specimens or absent in dead ones (pl. 1, fig. 3), if absent, the mouth area is covered by thin membrane; lateral ocellus present on small or rarely large vertex (pl. 5, fig. 28).

Thorax arched in front, scutellum large, well-raised (pl. 5, figs. 22, 24, 26), wing venation imperfect to extremely weak, costal vein reaching wing tip, m-cu and r-m crossveins present or absent, but usually veins present include at least Sc, R_1, R_{4+5}, M_4, and A; costal and subcostal cells present, usually with first, sometimes with second, basal cell present (pl. 3, figs. 6–13; pl. 4, figs. 14–21); legs usually slender, hind femur often swollen, tarsus with paired simple claws and three pulvilli.

Abdomen arched dorsally, flattened ventrally, tapering (male) or blunt (female) at apex, usually as high as wide, with six visible segments (pl. 5, figs. 22, 24, 26); male genitalia partly concealed under tergite VI, consisting of bowl-shaped 9th tergite, claspers, aedeagus, and ejaculatory apodeme, all more or less held in place by tergite IX (pl. 6, fig. 31); female genitalia simple, with obvious cerci and often with row of minute or larger setae along posterior margin of sternite IX.

[5] For adult. Descriptions of immature stages will be found in the biology section.

Key to the subgenera of *Ogcodes*

1. Terminal antennal segment narrowed and then bulbous basally, ending in a rather long tapering style on whose apex are one to four small setae (pl. 5, figs. 25, 27); proboscis usually not visible in dead specimens 2
   Terminal antennal segment shorter and broader basally, with several (usually 5–6) long apical setae (pl. 5, fig. 23); proboscis visible in dead specimen [Nearctic] . . . . . **Neogcodes,** new subgenus
2. Frons bisected medially, without pile, though usually with minute tomentum; terminal antennal segment without basal lateral bristle (pl. 5, fig. 25) [Cosmopolitan] . . . . . **Ogcodes** Latreille
   Frons not bisected medially, covered with obvious pile (pl. 5, fig. 28); base of terminal antennal segment with short, but strong, basolateral bristle (pl. 5, fig. 27) [Australian] . . . . . **Protogcodes,** new subgenus

Ogcodes (*Protogcodes*), new subgenus

Type species: *Ogcodes* (*Protogcodes*) *paramonovi*, new species, by present designation.

Diagnosis: This subgenus, as based on *paramonovi*, appears to be ancestral to both of the other subgenera. The following characteristics separate this subgenus from the other two subgenera: Antenna with third segment styliform as in subgenus *Ogcodes*, but its apex beset with several small setae as in subgenus *Neogcodes*, but differing from both by having a strong basolateral bristle on terminal segment and a shorter dorsal bristle on segment II. The frons is convex, not grooved medially, and is covered with obvious pile. The legs are quite long and thin. The abdomen is wider than the thorax, and is turned under and narrowed apically. The venter has rather large, lateral intersegmental areas.

Ogcodes (*Protogcodes*) *paramonovi*, new species

Plate figures 15, 27, 28, 60

Male: Length of entire specimen 7.75 mm., wing length 8.15 mm., head height 1.55 mm., head width 1.85 mm., head length 1.45 mm.

Head large, eyes nearly black, antenna dark brown, occiput dull black; frons large, about one-fourth head width, convex, covered with golden brown pile about one-third as long as antennal segment III (pl. 5, fig. 28); antennal segment I dish-shaped, short, segment II ball-shaped, fitting into I socket-like, both I and II covered with minute brown hairs; segment II has one dorsal bristle; segment III styliform, moderately swollen basally, with distinct bristle paralleling and about one-half as long as style, apex of segment with four, whitish brown setae (pl. 5, fig. 27); oral region oval, narrow, mouthparts rudimentary, but strong sclerotized proboscial plate present with long brown hairs crossing over below oral region.

Thorax dark brown, subshining, covered with yellowish brown pile about as long as antennal segment III; legs slender, not swollen, coxae, tarsal apices, claws, and pulvilli brown, remainder light brown, entirely covered with pile as on thorax, but gradually shortening towards extremities, hind femur and tibia of equal length; wing narrowed apically, nearly hyaline, faintly infuscated, veins dark brown except M_1, base of M_4, and anal, light brown or clear; crossvein m-cu present, crossvein r-m absent, but base of M_1 at this point long, extending near M_4, anal vein nearly joins Cu_2 at wing margin (pl. 4, fig. 15); squama large, opaque, snowy white, with dark brown margin, halter knob black on light brown stem.

Abdomen subshining, dark brown except light brown tergite I, tergites III and IV with extremely narrow posterior white fasciae, light brown sternites II-VI, and large white lateral intersegmental membranes between sternites I-V; tergites II-IV covered with pile (as on thorax) only on broad median area and narrow lateral margins; tergite V bare medially, but with similar pile on broad mesolateral and marginal areas; tergite VI bare medially, but with some marginal pile; sternite I shining, bare, II-VI covered evenly with pile as on dorsum, but shorter.

Genitalia small; aedeagus nearly acuminate at apex, and with distinct, subapical, ventral projection (pl. 9, fig. 60).

FEMALE: Unknown.

HOLOTYPE: Male, Ohakune (Wellington), North Island, New Zealand, 1922–23 (T. R. Harris, 1923–303, BMNH).

REMARKS: Superficially, *paramonovi* looks like (*Ogcodes*) *brunneus*, but its closest relative is no doubt an undescribed Australian species.[6] I take pleasure in naming this species after Dr. S. J. Paramonov, who has recently contributed much to furthering acrocerid taxonomy.

Subgenus *Ogcodes* (*Ogcodes*) Latreille, new status

Ogcodes Latreille, Precis. Caract. Gen. Ins., p. 154, 1796.

TYPE SPECIES: *Musca gibbosa* Linnaeus.

DIAGNOSIS: Antenna 3-segmented, terminal segment styliform, usually with one apical seta, sometimes with two or three, but never with basolateral bristle; frons bisected medially, without pile; proboscis (not visible in dead specimens) covered by thin oral membrane; abdomen commonly brown or black with white posterior fasciae on tergites, though often varicolored; legs sometimes with tibiae (particularly T_3) swollen distally.

DISCUSSION: Phylogentically, this subgenus divides into six species groups as based on wing venation, male genitalia, antennal structure

[6] This species has recently been described by Paramonov (1957) as *hirtifrons* (see appendix).

and pilation, but no doubt other groups will need to be added when more species can be studied. These species groups, together with typical species, distribution, and total number of presently assignable species, are listed in table 2.

TABLE 2.—*Species groups of the subgenus* Ogcodes *Latreille*

Species group	*Typical species*	*Distribution and included species*
I—*brunneus* group	*brunneus* (Hutton)	New Zealand (2)
II—*eugonatus* group	*eugonatus* Loew	Nearctic (2) Palaearctic (2) Ethiopian (2) Neotropical (1 ?)
III—*borealis* group	*borealis* Cole	Nearctic (1) Palaearctic (1)
IV—*colei* group	*colei* Sabrosky	Nearctic (5) Australian (6) Palaearctic (1) Neotropical (1)
V—*pallidipennis* group	*pallidipennis* Loew	Cosmopolitan except New Zealand (21)
VI—*porteri* group	*porteri* Schlinger	Neotropical (1)

The apparent relationships of these species groups are shown in text figure 1. The *brunneus* group, which is closely related to *Protogcodes paramonovi*, apparently gave rise to the more widespread *eugonatus* group. However, these two groups are presently widely separated geographically, and this might give the impression that their relationship is superficial. It seems likely that members of the *eugonatus* group will be found to occur in the Oriental region. Also, it seems likely that more species occur in the Ethiopian and Australian regions than is known at present, but the absence of material and the lack of adequate descriptions of genitalia and wing venation of the known species from the intervening areas prevent me from assigning many of the known species to this or other species groups. The Holarctic *borealis* group appears to be a rare, primitive one, which probably gave rise to both the *colei* and *pallidipennis* groups, the latter being the most common and widespread group of the subgenus. The *colei* group is not homogeneous, and might better be divided into two or three groups based primarily on wing venation and structure of the ejaculatory apodeme. However, enough characteristics seem to hold true for all the included species to maintain it as a single varied group at the present time.

The *pallidipennis* group is quite homogeneous, and although in some respects it seems to be more primitive than the *colei* group, it is certainly far more catholic in its adaptability. For example, there are as many species of the *colei* group in New Zealand as in all of the Nearctic region. A possible explanation for this might be that since the *pallidipennis* group is represented commonly in the latter region by no less than eight species, but is absent in New Zealand, there would appear to be no competition there, and thus the members of the *colei* group are not uncommon; whereas, in the Nearctic region, members of the latter group are extremely rare, while those of the *pallidipennis* group are the most abundant. It might be inferred that competition for the same hosts (as pointed out earlier in the biology section) among the various species of *Ogcodes* is one of the major factors in the "rareness" of some of the species.

It seems quite probable that some member of the *colei* group (possibly *vittisternum* Sabrosky) gave rise to *albiventris* (Johnson), which is now the monotype of the Nearctic subgenus *Neogcodes*. The *porteri* group remains a spurious one at present but is apparently most closely related to species of the *eugonatus* group.

Group I—*brunneus* group

DIAGNOSIS: Veins M_1, M_2, M_4, Cu_2, A, and crossveins m-cu and r-m present (pl. 3, fig. 8); median plate of ejaculatory apodeme either expanded basally (pl. 11, fig. 75) or not; basal cell of apodeme round, incomplete ventrally; apodemal wings short and median plate of medium size (pl. 12, fig. 83); aedeagus somewhat narrowed or broadened at apex, with small or no postgonoporal notch; body pile rather even and not extremely long; terminal antennal segment with one to three small apical setae; abdomen with typical fasciae on tergites (pl. 5, fig. 29).

INCLUDED SPECIES: *O. brunneus* (Hutton) and *consimilis* Brunetti.

Group II—*eugonatus* group

DIAGNOSIS: Vein M_1 absent, except sometimes faintly visible at apex; crossvein m-cu absent (pl. 4, figs. 18, 19); ejaculatory apodeme with short wings and incomplete basal and subbasal cells (pl. 11, fig. 78); median plate in lateral view narrow, nearly equi-breadth, directed anteriorly (pl. 12, figs. 91, 93, 94); aedeagus blunt apically, flat subapically, without postgonoporal notch (pl. 10, fig. 69; pl. 11, figs. 71, 73); apex of antenna usually with one seta; body pile of medium length and quite even; abdomen fasciated (pl. 5, fig. 29) or sometimes patterned. This group was partly defined by Sabrosky (1948, p. 410) as "#3, *eugonatus* complex."

INCLUDED SPECIES: *O. caffer* Loew, *chilensis* Sabrosky (?), *eugonatus* Loew, *guttatus* Costa, *melampus* Loew, *nigripes* Zetterstedt, and *zonatus* Erichson.

Group III—*borealis* group

DIAGNOSIS: Veins M_1, M_2, M_4, Cu_2, A, and crossveins m-cu and r-m present (pl. 3, fig. 7); ejaculatory apodeme with median plate of medium size, short wings, and well-defined basal and subbasal cells (pl. 11, figs. 72, 76); aedeagus either blunt apically with large pregonoporal and postgonoporal notches (pl. 9, fig. 56), or narrowed, curved and rounded without postgonoporal notch (pl. 8, fig. 51); body pile rather short, not dense; apex of antenna with two or three short setae; abdomen fasciated somewhat (pl. 5, fig. 29). This group was partly defined by Sabrosky (1948, p. 410) as "#2."

INCLUDED SPECIES: *O. borealis* Cole and *pallipes* Latreille.

Group IV—*colei* group

DIAGNOSIS: Vein M_1 usually present together with crossvein m-cu; however, M_1 or m-cu may be present alone in some species, but both veins are not totally absent (pl. 3, figs. 9, 12; pl. 4, figs. 14, 21); ejaculatory apodeme weakly developed, often inconspicuous (pl. 12, figs. 95–98), or sometimes developed about as well as in species of the *eugonatus* group (pl. 12, figs. 84, 87–90); basal and subbasal cells, when present, weakly defined (pl. 11, figs. 77, 79); aedeagus usually slender and rather acuminate apically with or without large pregonoporal and postgonoporal notches (pl. 6, fig. 31; pl. 9, figs. 52–55, 57–59; pl. 10, figs. 61–64; body pile unusually long in most species, others with only patches of long pile on several tergites; apex of antenna with two or three short setae; abdomen often very colorfully patterned (pl. 5, fig. 30), rarely only with simple fasciae (pl. 5, fig. 29). This group was partly defined by Sabrosky (1948, p. 410) as "#4, *colei* complex."

INCLUDED SPECIES: *O. argigaster*, new species, *colei* Sabrosky, *floridensis* Sabrosky, *fortnumi* Westwood, *hirtus* Sack, *kuscheli* Sabrosky, *leptisoma*, new species, *nitens* (Hutton), *pygmaeus* White, *shewelli* Sabrosky, *similis*, new species, and *vittisternum* Sabrosky.

Group V—*pallidipennis* group

DIAGNOSIS: Veins M_1, M_2, M_4, Cu_2, A, and crossvein r-m present; crossvein m-cu absent, or at most a faint trace (pl. 3, figs. 10, 11, 13; pl. 4, fig. 20); ejaculatory apodeme well developed; median plate and wings large; basal cell large, complete or incomplete ventrally, subbasal cell high, but thin and rather inconspicuous (pl. 6, figs. 32, 33;

pl. 11, fig. 80; pl. 13, figs. 99–112); aedeagus variable in shape, ranging from being quite curved near apex and ending in rounded tip (pl. 7, figs. 34–40; pl. 8, figs. 46, 47) to being somewhat truncate at apex (pl. 7, figs. 41, 42; pl. 8, figs. 43–45, 48), or rarely being almost pointed apically (pl. 8, fig. 50); commonly the apex has a small postgonoporal notch and a large, gently curving, pregonoporal notch, but the reverse also occurs; body pile short, even, obscure in some species; apex of antenna usually with one seta; abdomen usually with typical fasciae (pl. 5, fig. 29), but some species are maculated. This group was partly defined by Sabrosky (1948, p. 409) as "#1, *pallidipennis* complex."

INCLUDED SPECIES: *O. basalis* (Walker), *clavatus* Becker, *dispar* (Macquart), *dusmeti* Arias, *gibbosus* (Linnaeus), *pallidipennis* Loew, *reginae* Trojan, *rufoabdominalis* Cole, *varius varius* Latreille, *varius pallidimarginalis* Brunetti, *varius siberiensis* Brunetti, and the following new species: *adaptatus, argentinensis, boharti, brasilensis, canadensis, colombiensis, hennigi, orientalis, philippinensis,* and *sabroskyi.*

Group VI—*porteri* group

DIAGNOSIS: Veins M_1, M_2, M_4, and crossveins m-cu and r-m absent; anal area greatly reduced as is vein R_{4+5}; vein R_1 and costa also shortened (pl. 4, fig. 16); male genitalia have not been examined in the only known specimen; body pile short and sparse; antennal structure unknown; male abdomen patterned as in some species of *Acrocera* with sinuated fasciae.

INCLUDED SPECIES: *O. porteri* Schlinger.

Ogcodes (*Ogcodes*) species of Australian subregion

As Paramonov has prepared a revision of the Australian Acroceridae (in press)[7], I shall not attempt to deal with this fauna at any great length at this time. Sixteen species have been recorded from Australia and Tasmania. From Australia: *basalis* (Walker), *castaneus* Brunetti, *darwinii* Westwood, *doddi* Wandolleck, *fortnumi* Westwood, *fratellus* Brunetti, *fraternus* Brunetti, *ignava* Westwood, *insignis* Brunetti, *variegatus* Brunetti, *victoriensis* Brunetti. From Tasmania: *ater* White, *flavescens* White, *nigrinervis* White, *pygmaeus* White, and *tasmanica* Westwood.

From this study it appears that at least three species groups are present in this region; namely, the *pallidipennis, colei,* and possible the *brunneus* groups. Also, I have seen one female specimen of an undetermined species in the new subgenus *Protogcodes* from Australia.

[7] Since completion of my work, Paramonov's paper (1957) has been published. See appendix and bibliography.

***Ogcodes* (*Ogcodes*) *basalis* (Walker)**

PLATE FIGURES 46, 101

Henops basalis Walker, Ins. Saunders. Dipt., vol. 1, p. 203, 1852.
Oncodes basalis, Hardy, in part, Pap. Proc. Roy. Soc. Tasmania for 1917, pp. 60–61, 1918.—Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 599, 1926.
Oncodes basilis, Hardy, in part, Pap. Proc. Roy. Soc. Tasmania for 1917, pp. 60–61, 1918; in part, Pap. Proc. Roy. Soc. Tasmania for 1921, p. 78, 1940; in part, Proc. Linn. Soc. New South Wales, vol. 45, pp. 486–487, 1940.

TYPE LOCALITY: New South Wales, Australia (1 ♂, BMNH).

DIAGNOSIS: This species is a member of the *pallidipennis* group. The males are typically brightly tricolored, black, orange, and white; the females typically quadricolored, black and brown with some orange and white markings. Both sexes have posterior white tergal fasciae and a black thorax. The wings may be infuscated or nearly clear. The female abdomen is mostly brown above, white below, while the male is white below and the dorsum is orange with median and lateral black spots (sometimes with a brownish tinge), the former usually on tergites II–IV, the latter on II–VI. The legs of the male are bright orange except for browned coxae, basal one-half of femora, and tarsi, while the female legs are mostly dark brown to black, but usually with orange markings on knees and apex of tibiae. Vein M_1 and crossvein r-m are strong. The male genitalia resemble those of several species of the group, but are actually most similar to *varius* Latreille and *philippinensis*, new species (see pl. 13, figs. 99, 101, 109).

DISCUSSION: The identity of this species has been often confused since its description by Walker. Hardy (1918) synonymized nine species under *basalis* of which five were from Tasmania, and in 1922 he added one more to the list. Brunetti (1926) examined the holotype of *basalis*, but, strangely enough, compared it only with his Ceylonese species, *rufomarginatus*, and thus his discussion is of little use here. Hardy (1940), in a brief synopsis of the Australian species, concluded that all the species except *variegatus* Brunetti were merely color variants of *basalis* (as *basilis*), a conclusion based on limited material and superficial characters. Plomley's (1947a, 1947b) interesting works on the biology and taxonomy of *basalis* actually dealt with *pygmaeus* White. He also had specimens of *fortnumi* Westwood from the same locality, but did not figure the latter species. This misidentification became apparent by an examination of several of his specimens which had been determined by Paramonov as either *pygmaeus* or *fortnumi*.

It seems probable that *darwinii* Westwood is a synonym of *basalis*, but this will have to await an examination of the types. Aside from other possible Australian relatives, *basalis* is related to *philippinensis*,

new species, *varius* Latreille, and *orientalis*, new species. I have seen a male specimen of what is probably a new species from Olokemeji, Ibadan, Nigeria, West Africa (Bridwell, USNM), which is similar to *basalis*, and both this species and *varius* Latreille show that relatives of *basalis* occur quite a distance from the Australian region.

SPECIMENS EXAMINED: 3 ♂, 6 ♀.

AUSTRALIA: 1 ♂, Sydney, September 1915 (Bridwell, USNM); 2 ♀, Sydney, Aug. 2, 1903 (USNM); 1 ♀, Aralong, Bucclengh (T. Vaughn-Sherrin, USNM); 1 ♀, Coonabarabran District, New South Wales, Sept. 23, 1936 (K. H. L. Key, SJP) [det. as *darwini* by Paramonov]; 1 ♀, Donnybrook, West Australia, Sept. 13, 1938 (K. R. Norris, SJP); 1 ♂, Canberra, Feb. 3, 1951 (K. H. L. Key, SJP); 1 ♂, Acacia Plat., New South Wales (J. Armstrong, SJP) [det. as *darwini* by Paramonov]; 1 ♀, New South Wales (#514, Hy. Edwards Collection, AMNH).

***Ogcodes* (*Ogcodes*) *pygmaeus* White**

PLATE FIGURES 58, 77

Oncodes pygmaeus White, Pap. Proc. Roy. Soc. Tasmania for 1914, p. 72, 1915.
Oncodes basalis, Plomley, Rec. Queen Victoria Mus., vol. 2, pp. 17–22, figs. 1–5, 1947a; in part, Rec. Queen Victoria Mus., vol. 2, pp. 23–30, 1947b (not Walker, 1852).

TYPE LOCALITY: Launceston, Tasmania (1♀, Littler Collection, South Australian Museum).

DISCUSSION: *O. pygmaeus* is a member of the *colei* group. This small mostly brown species is closely related to *fortnumi*. It has characteristics of *nitens* (Hutton) from New Zealand, and may also possibly be close to the Tasmanian species *flavescens* White, which, judging from its original description, appears to belong in the *colei* group. The thorax in both sexes of *Ogcodes pygmaeus* is shining black and covered with fairly long brown pile. The abdomen of the male has long pile on tergites II and III, and the genitalia resemble those of *fortnumi* and *nitens*. The legs and abdomen are light and dark brown in the male and mostly dark brown in the female. Vein M_1 is present though faint throughout and ends in a long curve close to the wing margin well beyond vein R_{4+5}. Crossvein m-cu is present but faint, crossvein r-m is absent. The genitalia were figured by Plomley (1947a, figs. 1–5) under the name of *basalis* Walker. The aedeagus has been redrawn here (pl. 9, fig. 58). The ejaculatory apodeme in lateral view appeared identical to that of *fortnumi* (pl. 12, fig. 84); however, it was quite different from the latter species in anterior view (compare pl. 11, figs. 74 and 77).

SPECIMENS EXAMINED: 1 ♂, 1♀.

AUSTRALIA: 1 ♂, 1 ♀, Upper Blessington, *Tasmania*, Feb. 6, 1936 (J. J. B. Plomley, SJP) [det. by Paramonov].

Ogcodes (Ogcodes) fortnumi Westwood

PLATE FIGURES 57, 74, 84

Ogcodes fortnumi Westwood, Trans. Ent. Soc. London, p. 516, 1876.
Oncodes basalis, Plomley, in part, not figures, Rec. Queen Victoria Mus., vol. 2, pp. 17–22, 1947a; in part, Rec. Queen Victoria Mus., vol. 2, pp. 23–30. 1947b (not Walker, 1852).

TYPE LOCALITY: Adelaide, Australia (Hope Museum).

DISCUSSION: This species belongs in the *colei* group and is similar to *pygmaeus*, described above; however, I am not certain as to the identity of this species since the only specimens available for study were from Tasmania, not Australia. They were determined as *fortnumi* by Paramonov, and formed part of the series reported on by Plomley (1947a, 1947b). It should be noted that his specimens of *pygmaeus* White (as *basalis*) were collected on Feb. 6, 1936, while those of *fortnumi* were collected on Mar. 6, 1936, and thus they did not necessarily represent one population. Although Plomley (1947a, pp. 20–21) noted considerable variation in his large series of Upper Blessington specimens, he followed Hardy (1918, 1940) and was misled in assuming that his specimens were all *basalis*. Actually it is very doubtful that *basalis* was represented in his series at all.

On the basis of male genitalia there is little doubt that *fortnumi* is closely related to *pygmaeus* White (see pl. 9, figs. 57–58). It is also similar to *nitens* (Hutton), and has certain affiliations with *borealis* Cole and *kuscheli* Sabrosky (see pl. 9, figs. 52, 56–57, 59; pl. 11, fig. 79; pl. 12, figs. 84, 88).

SPECIMENS EXAMINED: 2♂, 1♀.

AUSTRALIA: 1♂, 1♀, Upper Blessington, Tasmania, Mar. 6, 1936 (N. J. B. Plomley, SJP); 1♂, Perth, Feb. 25 to Mar. 12, 1936 (R. E. Turner, BMNH).

Ogcodes species of New Zealand subregion

Key to the New Zealand species of genus *Ogcodes* [8]

1. Vein M_1 faintly present or only a crease; dorsum of abdomen with white markings other than fasciae 2
   Vein M_1 present, usually as dark as R_{4+5}, sometimes clear, but always vein-like; dorsum of abdomen without white markings except when fasciae are present 3
2. Entire abdomen white except for brown tergites I and VI, median spot on II, and posterior margin of V; tibiae and tarsi mostly yellow or white.
   argigaster, new species

[8] Females of (*O.*) *argigaster*, (*O.*) *leptisoma*, (*O.*) *similis*, and (*Protogcodes*) *paramonovi* have not been examined. Females of (*O.*) *brunneus* and (*O.*) *consimilis* will probably key out together (see discussion under *brunneus*).

Paramonov's (1955, p. 23) key to the *Oncodes* of New Zealand is misleading in several points and caution should be exercised in using it. Only the males of *consimilis* will key out correctly.

Tergites dark brown except for large white mesolateral spots on tergites III and (usually) IV; venter with some indication of brown anterior fasciae on all sternites; tibiae and tarsi mostly brown . . . . . **nitens** (Hutton)

3. Wing distinctly and evenly infuscated; anal vein joins vein Cu_2 far before hind wing margin; abdomen with dense, nearly appressed, silvery, short pile on tergites II and III laterally . . . . . **leptisoma,** new species

Wing mostly hyaline; anal vein does not reach vein Cu_2; abdomen without silvery pile as indicated above 4

4. Frons without pile; tergites with normal posterior white fasciae 5

Frons well developed and with long pile; tergites black to dark brown without white posterior fasciae except narrowly on IV and V.

(Protogcodes) paramonovi, new species

5. Body covered with brown pile; abdomen with medial clumps of pile on tergites II–IV and lateral clumps on IV–VI . . . . . **similis,** new species

Body covered with whitish yellow pile; abdomen without clumps of pile . . . 6

6. Abdomen usually with tergites I and II black, the remainder brown in the males; legs mostly light brown . . . . . **consimilis** Brunetti

Abdomen rather concolorous dark brown or black; legs mostly dark brown.

brunneus (Hutton)

Ogcodes (*Ogcodes*) *brunneus* (Hutton)

PLATE FIGURES 8, 68, 82

Henops brunneus Hutton, Cat. Dipt. New Zeal., p. 24, 1881.—Maskell, Trans. New Zealand Inst., vol. 20, pp. 106–108, pl. 10, 1888.—Hutton, Trans. New Zealand Inst., vol. 33, p. 29, 1901.

Oncodes brunneus, Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 593, 1926.—Dumbleton, New Zealand Journ. Sci. Tech., vol. 22 (sec. A), pp. 97a–101a, figs. 1–5, 1940.—Paramonov, Pacific Sci., vol. 9, p. 23 (=*brunneus*?), 1955.

TYPE LOCALITY: Lake Wanaka, Otago, South Island, New Zealand (Canterbury Museum, New Zealand).

DIAGNOSIS: Species of group I with typical white abdominal fasciae, otherwise whole body dark brown to black and covered with moderately long, whitish yellow pile except median portion of tergites IV–VI of male; wing hyaline, veins mostly clear except costa and radius brown; vein M_1 and crossveins m-cu and r-m present but rather pale (pl. 3, fig. 8); squama snowy white, opaque, narrowly margined light or dark brown, halter mostly light brown; male genitalia dark brown, median plate long and narrow in lateral view (pl. 11, fig. 82); basal cell large, subbasal cell small, "wings" short, aedeagus expands toward apex, which is narrowly rounded (pl. 10, fig. 68).

DISCUSSION: It seems clear that *consimilis* Brunetti is closely related to *brunneus,* but the genitalia easily separates the two. However, I have been unable to find any specific differences between the females of the two species. I have seen several specimens of what appeared to be *brunneus,* but only one of these was a male, and thus the genitalic character mentioned above may be more variable than noted. Other male specimens that had tentatively been considered to be

brunneus on the basis of their coloration were found to be *consimilis* on the basis of their genitalia. Thus, some confusion still exists between these two species.

Brunetti (1926) apparently had at least three species included under *brunneus*, and thus his distribution records should be queried. Certainly his remarks about the specimen from "Gollans Valley" refer to *nitens* (Hutton), unless it was a female, in which case it may possibly have been *argigaster*, new species. Brunetti compared his *consimilis* to *basalis*, a species which has never been recorded from New Zealand. If he had compared it to *brunneus* he would have no doubt seen the great similarity between the two species. Judging from Paramonov's (1955) key and from the writings of Hutton and Maskell, *brunneus* of Paramonov was not the same as that of Hutton (1881, 1901) unless Paramonov had an extremely dark example. A solution to the identity of these two species becomes more complex because specimens of both "species" that were collected on the same day at Ohakune, New Zealand, have been examined. Also, if the type specimen of *brunneus* should be a female, as I suspect it is, the problem of knowing the true identity of these two species will become even more acute.

Maskell (1888) and Dumbleton (1940) have described and figured the first-instar larva of *brunneus*, and Dumbleton recorded *Matachia ramulicola* Dalmas as a host.

Specimens examined: 1 ♂, 8 ♀.

New Zealand: Ohakune, Wellington, North Island, 1 ♂, Jan. 15, 1920 (T. Harris, USNM); 6 ♀, January 1924 (T. R. Harris, BMNH); 2 ♀, March 1922 (T. Harris, USNM, EIS).

Ogcodes (*Ogcodes*) *consimilis* Brunetti

Plate figures 67, 75, 83

Oncodes consimilis Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 603, 1926.—Paramonov, Pacific Sci., vol. 9, p. 24, 1955.

Type locality: Mount Ruapehu, North Island, New Zealand (♂ ?, BMNH).

Diagnosis: A species of group 1 that differs from *brunneus* only in the male as follows: Tergites 1 and 11 typically black, rather shining, other tergites dark brown; male genitalia with aedeagus much narrower and more pointed at apex (pl. 10, fig. 67); ejaculatory apodeme of different shape (pl. 11, fig. 75; pl. 12, fig. 83), median plate with rodlike swelling.

Discussion: As brought out under *brunneus*, there is some confusion about the distinctness of *consimilis* and the former, but several typical males have been examined from Kumara and Blackhall. On the other hand, a topotypical male of *consimilis* had some of the

characteristics of *brunneus* and might have been determined as the latter species except for the genitalic features.

SPECIMENS EXAMINED: 8 ♂, 5 ♀.

NEW ZEALAND: North Island: 4 ♂, 1 ♀, Ohakune, Wellington, Dec. 25, 1919, Jan. 10–15, 1920, March 1922 (T. R. Harris, USNM, EIS); 1 ♀, Silverstream, Wellington, Dec. 3, 1936 (USNM); 1 ♂, Eglinton Volcano, Dec. 31, 1920 (Fenwick, USNM); 1 ♂, (topotype), Jan. 7, 1922 (Fenwick, USNM). South Island: 2 ♂, 2 ♀, Kumara, Westland, Dec. 14–15, 1929, Jan. 7, 1930 (J. W. Campbell, USNM, EIS); 1 ♀, Greymouth, Westland (EIS).

***Ogcodes* (*Ogcodes*) *similis*, new species**

PLATE FIGURES 55, 87

Species of group IV.

MALE: Length of entire specimen 4.50 mm., wing length 4.00 mm.

Head dark brown except for black occiput, frons, and oral area; ocellar tubercle small; frons narrow, no wider than ocellar tubercle, flat, not protruding, grooved medially; antenna with segments I and II appearing fused, III only slightly swollen basally, long, thin, with two short apical setae; mouth area oval, proboscial cover yellow.

Thorax shining black, covered with reddish brown pile about as long as antennal segment III; legs slender, coxae black, femora dark brown, remainder light brown; wing hyaline, veins light brown and faint; vein M^1 and crossvein m-cu present but faint, vein Cu^2 does not meet anal vein, stops just short of wing margin, venation similar to that shown in plate 3, figure 8; squama delicate, base and narrow rim brown, transparent but most of central area whitish, halter stem brown, knob broken off.

Abdomen dark brown except for narrow posterior white fasciae on tergites II–VI, somewhat larger fasciae on sternites III–V, and white pleural membrane; dorsum covered with short, sparse brown pile with longer clumps of pile on medial area of tergites II–IV and lateral areas of IV–VI; venter covered with short, sparse brown pile except for sternite I.

Genitalia small, aedeagus narrowed and notched apically (pl. 9, fig. 55); ejaculatory apodeme of medium build, directed anteriorly, median plate about as wide as long in lateral view (pl. 12, fig. 87).

FEMALE: Unknown.

HOLOTYPE: Male, New Zealand, 1928 (G. V. Hudson, BMNH, 1948–73).

REMARKS: This species is related to *nitens*, *pygmaeus*, and *argigaster*, being perhaps most closely associated with the Tasmanian *pygmaeus*. It is easily separated from these species by the structure of the male genitalia (compare pl. 9, figs. 52, 53, 55, 58; pl. 12, figs. 87, 89, 90) and the features given in the key above.

***Ogcodes (Ogcodes) leptisoma*, new species**

PLATE FIGURES 61, 95

Species of group IV.

MALE: Length of entire specimen 5.50 mm., wing length 4.50 mm.

Head dark brown except black occiput; ocellar tubercle small, hardly protruding, frons small, no wider than ocellar tubercle, flat, not protruding, grooved medially; antenna with segments I and II appearing fused, III only slightly swollen basally, very long and thin, with two apical setae; mouth area oval, quite narrow.

Thorax shining black, only pleura dark brown, entirely covered with whitish yellow pile about as long as antennal segment III; legs slender, especially tarsal segments, but apices of both hind femur and tibia swollen, dark brown except femora and most of tibiae yellow; wing evenly infuscated, veins dark brown, vein M_1 and crossvein m-cu present and distinct, anal vein joins Cu_2 before hind wing margin, though faint at junction; squama rugose, opaque, dark brown infuscated, halter knob brown with white markings, stem light brown.

Abdomen dark brown except for narrow, pale, yellowish brown posterior fasciae on tergites I–VI, sternites II–VI brownish yellow with wide posterior fasciae on II and III, and pleural membrane white; dorsum with short, silvery, nearly appressed pile on posterior two-thirds of tergite I, all of II, and small mesolateral area of III; long, brown pile present along lateral margin of all segments and large mesolateral area of tergite V, short brown pile along midline of tergites II and III, and most of IV; median area of V and all but margin of VI bare of pile and shining; venter evenly covered with short yellowish brown pile except for bare and shining sternite I; spiracles of segments II–IV appearing as brown spots in white membrane.

Genitalia dark brown, small, aedeagus slender, nearly acuminate (pl. 10, fig. 65); ejaculatory apodeme without definite median plate, the whole apodemal structure minute with small spiculae below and on wings (pl. 12, fig. 95).

FEMALE: Unknown.

HOLOTYPE: Male, Queenstown, Otago, South Island, New Zealand, Dec. 12, 1922 (Leon Curtis, USNM 64438).

PARATYPES: 3 ♂, all New Zealand; 1 ♂, Glenorchy, Jan. 3, 1923 (F. S. Oliver, EIS); 2 ♂, Wilton's Bush, Wellington, Dec. 6, 1920 (G. V. Hudson, BMNH, 1923–323).

The holotype's abdomen apparently was damaged somewhat during its capture, so the characteristic shape of the abdomen is noted from the paratypes as follows: In dorsal view, segments II, III, and IV are of equal length and width, and together make up about three-fourths the length of the abdomen; in lateral view, the venter is shallowly

concave, and the dorsum is highly arched with its highest point at the junction of tergites III and IV. Otherwise the paratypes agree with the holotype.

REMARKS: Although *leptisoma* is somewhat similar to *pygmaeus* White from Tasmania, the two can easily be separated by the male genitalia. Closest relatives appear to be the Nearctic species *vittisternum* Sabrosky, *shewelli* Sabrosky, and *colei* Sabrosky, as noted by structures of the male genitalia (compare pl. 10, figs. 61–64 and pl. 12, figs. 95–98). There is no known close relative in New Zealand. The name *leptisoma* refers to the scale-like pile of the abdomen.

***Ogcodes (Ogcodes) argigaster*, new species**

PLATE FIGURES 14, 53, 89

Species of group IV.

MALE: Length of entire specimen 6.10 mm., wing length 6.00 mm.

Head dark brown except for black occiput; ocellar tubercle small, hardly protruding, frons large, protruding and depressed medially; apex of terminal antennal segment with two minute setae; mouth area oval.

Thorax shining black, covered with long whitish yellow pile about as long as antennal segment III; legs slender, only apex of hind femur swollen, coxae, trochanters, knees, last tarsal segment and claw dark brown, femora infuscated, tibiae and remainder of tarsi whitish yellow; wing transparent, veins white; vein M_1 present but crease-like, not distinct, crossvein m-cu present, r-m crossvein faint, indistinct, anal vein separated from Cu_2 at wing margin (pl. 4, fig. 14); squama vertically raised near base, arched throughout, white with thin yellow margin, halter knob dark brown, stem lighter brown.

Abdomen opaque white except for dark brown on most of tergite I, small median spot on II, all of IV, lateral margin of sternite I, genitalia and spiracles; posterior portion of segments II–IV with narrow yellow margins; tergites covered with long white pile along lateral margins and median area of II to the base of IV, with short, dense, downy pile on mesolateral part of tergite II, otherwise dorsum shining and bare; venter covered with long pile on middle two-thirds of each sternite throughout its width except sternite II with somewhat longer pile and I bare.

Genitalia small, aedeagus pointed apically with large, postgonoporal notch; aedeagal sheath long, reaching out near tip of aedeagus (pl. 9, fig. 53); ejaculatory apodeme of medium build, median plate directed anteriorly (pl. 12, fig. 89).

FEMALE: Unknown.

HOLOTYPE: Male, Cass, New Zealand (USNM 64439); 1♂, paratopotype (USNM).

The paratopotype agrees essentially with the holotype, differing only in having a little more brown on the abdomen as follows: a small median spot on tergite III, and most of the posterior two-thirds of V. The paratype is 7.00 mm. long; its wing length 6.70 mm.

REMARKS: This species is closely related to *nitens* (Hutton), but is easily separated by the lighter coloration, larger size, and structure of the male genitalia (see pl. 9, figs. 52–53; pl. 12, figs. 89–90). The Nearctic species *colei* Sabrosky shows a very close resemblance to this new species but differs mainly in the characters cited above for *nitens*. The name *argigaster* refers to the white abdomen.

***Ogcodes* (*Ogcodes*) *nitens* (Hutton)**

PLATE FIGURES 52, 79, 90

Henops nitens Hutton, New Zealand Inst. Trans., vol. 33, p. 29, 1901.
Oncodes brunneus, Brunetti, in part (?), Ann. Mag. Nat. Hist., vol. 18, p. 594, 1926.
Oncodes nitens, Paramonov, Pacific Sci., vol. 9, p. 24 (?), 1955.

TYPE LOCALITY: Auckland and Wellington, New Zealand (Canterbury Museum, New Zealand).

DIAGNOSIS: Species of group IV. Male with brown and white maculated abdomen.

Thorax shining black, covered with long dense whitish brown pile which appears dark brown at its base; legs mostly dark brown, tibiae and tarsi somewhat lighter brown; wing transparent, wing veins pale, vein M_1 a faint crease, crossvein m-cu present, r-m crossvein absent; squama opaque white, hyaline near margin which is narrowly brownish yellow.

Abdomen shining dark brown except usually for posterior margins of sternites, posterior lateral margin of tergite II, large mesolateral spots on III and IV, and narrow posterior fasciae on II–V which are white to brownish white; dorsum covered with long white pile along lateral margins and median area of tergites II–IV, with short white pile on mesolateral area of tergite II, remainder of abdomen mostly bare and shining.

Genitalia small, aedeagus pointed apically (pl. 9, fig. 52); ejaculatory apodeme with long, narrow median plate in lateral view (pl. 12, fig. 90); wings bent downwards (pl. 11, fig. 79).

DISCUSSION: This species has never been clearly defined and Hutton's description (1901) is entirely too brief to be useful. Paramonov (1955) saw no specimens of *nitens*, and to my knowledge no records since Hutton have been given. Paramonov's key to the New Zealand species was erroneous as he contended that both the abdomen and its pile were black, whereas Hutton (1901, p. 29) clearly stated ". . . a spot on each side of the second and third abdominal segments, tawny." The specimens examined by me, and upon which

the above diagnosis was made, were all males, and fit Hutton's description except that the abdomen was brown and white instead of black and tawny. It seems probable that Hutton had only female specimens, which perhaps are darker than the males, as found in many species of *Ogcodes*.

Brunetti (1926, p. 594) cited a specimen of *brunneus* (Hutton) from "Gollans Valley, 24. xii. 1921 (G. V. Hudson)," and commented that "the specimen from Gollans Valley has a pale, irregularly-shaped spot of some size, but with indefinite outline towards each side margin on the third segment." This specimen was very likely *nitens*, as one of the males I have seen had only one lateral spot instead of the usual two.

The resemblance of *nitens* to *shewelli* Sabrosky from the eastern United States is striking, and there seems to be little doubt that the two are related in spite of their geographical separation. In New Zealand, the new species *argigaster* and *similis* appear to be the only close relatives of *nitens*.

SPECIMENS EXAMINED: 7 ♂, 2 ♀.

NEW ZEALAND: 3 ♂, 1 ♀ (without abdomen) and 1 ♀ ♂ (in copula), Port Hills. Dec. 2, 1923 (J. W. Campbell, USNM, EIS); 2 ♂, Casmere, Jan. 3, 1922 (T. R. Harris, USNM); 1 ♂, Governor's Bay, Dec. 2, 1923 (J. W. Campbell, USNM),

Ogcodes species of Polynesian subregion

The only species known from this area are *costalis* (Walker), *javanus* Meijere, and *trifasciatus* Meijere. As I have not seen any specimens from this subregion, the assignment of the species to species groups and their specificity will have to await further study. See the list of species (p. 316) for further notes and references.

Ogcodes species of Ethiopian region

The following 11 species and subspecies have been recorded from this area: *alluaudi* Becker, *caffer* Loew, *clavatus* Becker, *coffeatus* Speiser, *congoensis* Brunetti, *crassitibialis* Brunetti, *distinctus* Brunetti, *neavei* Brunetti, *nyasae* Brunetti, *trilineatus* Brunetti, and *varius pallidimarginalis* Brunetti.

To my knowledge no one has attempted to revise the African species, but two of the most comprehensive works were those of Brunetti (1926) and Sabrosky (1950).

From Brunetti's description of *distinctus* (1926) it seems very possible that he had a specimen of *guttatus* Costa, which at that time was not known to occur in Africa. This latter name should now be added to the above list of Ethiopian species (see discussion under

guttatus). Likewise it seems that *crassitibialis* Brunetti may be *clavatus*, while *sorellus* Brunetti was found to be a synonym of *caffer* Loew. Thus, a tentative estimate of the number of Ethiopian *Ogcodes* species is 12.

Although specimens representing at least four species have been examined, only two of these can be properly determined and discussed at this time.

Ogcodes (Ogcodes) caffer Loew

Plate figures 19, 69, 93

Oncodes caffer Loew, Vet. Akad. Forhand., vol. 14, p. 368, 1857; Dipt. Sudafrika, p. 255, 1860.

Oncodes sorellus Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 603, 1926. New synonymy?

Type locality: Africa: Caffrerei, *caffer;* and Natal, *sorellus.*

Discussion: This species is a member of group II. The examination of seven specimens from South Africa, which fit Loew's description of *caffer* well, were compared with the original description of *sorellus*, and no significant differences could be found. Brunetti was apparently unaware of *caffer* when he described *sorellus*, just as he ignored nearly all the described species of the genus at the time of his publication (1926). As pointed out by Sabrosky (1950) and by this author under various species in the text, it seems probable that many of Brunetti's species may fall into synonymy as they become better known.

The species *caffer* appears to be more closely related to the Palaearctic *zonatus* Erichson and the Nearctic *eugonatus* Loew than to any other known species. The abdominal pattern of the latter species was nicely drawn by Cole (1919, pl. 15, fig. 42) as *marginatus* Cole, and serves to illustrate the pattern of *caffer*. The slight differences noted in the wing venation among these three related species are shown in plate 4, figures 18, 19, and differences in male genitalia are shown in plate 10, figure 69; plate 11, figures 71, 73; plate 12, figures 93, 94. Otherwise the description of *caffer* fits that given for *eugonatus* (see below).

Specimens examined: 6 ♂, 1 ♀.

South africa: 2 ♂, 1 ♀, Cape Province, Matjesfontein, Oct. 6–15, 1926 (R. E. Turner, BMNH, EIS); 4 ♂, Cape Town, Milnerton, January 1926 (R. E. Turner, BMNH).

A female from Cape Province, Swellendam, February 1932 (R. E. Turner, BMNH), also was examined. It belongs in the *eugonatus* group, but apparently is distinct from *caffer*, at least by its general coloration.

Ogcodes (*Ogcodes*) *clavatus* Becker

PLATE FIGURES 10, 48, 110

Oncodes clavatus Becker, Bull. Mus. Hist. Nat. Paris, vol. 15, No. 3, p. 113, 1909; Ann. Soc. Ent. France, vol. 79, p. 22, 1910.

Oncodes cepisetis Speiser, *in* Sjostedt, Kilimandjaro-Meru Exped., vol. 2, part 10, No. 4, p. 74, 1910 [synonymy by Sabrosky, 1950].

(?) *Oncodes nyasae* Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 598, 1926 [synonymy by Sabrosky, 1950].

Oncodes crassitibialis Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 602, 1926. New synonymy?

Ogcodes clavatus, Sabrosky, Proc. Roy. Ent. Soc. London, vol. 19, p. 51, 1950.

TYPE LOCALITY: Africa: British East Africa, *clavatus;* Mt. Meru, *cepisetis;* Nyasaland, *nyasae;* and East Africa, *crassitibialis.*

DISCUSSION: This species belongs in group v. Sabrosky (1950) has given a good account of the variation occurring in *clavatus.* In examining part of his observed series of *clavatus,* as compared to the original description of *crassitibialis* Brunetti, I conclude that the latter species is very likely a synonym of *clavatus.*

Although *clavatus* is surely a member of the *pallidipennis* group, the male genitalia show it to be set apart somewhat from all other species of the group (see pl. 8, fig. 48, pl. 13, fig. 110). The wing also shows a definite group relationship; however, it is one of the few species seen that has the r-m crossvein perpendicular to the costa (see pl. 3, fig. 10).

The relationships of *clavatus* to other species are not fully understood, but colorwise it resembles *guttatus* Costa. However, the latter is a member of the *eugonatus* group and is therefore not closely related phylogenetically. Perhaps such species as *congoensis, neavei,* and *trilineatus* (all Brunetti, 1926) will be found to be associated species.

SPECIMENS EXAMINED:

EAST AFRICA: 5♂, Naivasha, Kenya, July 1937, September 1939, and April 1940 (H. J. A. Turner, USNM, EIS).

Ogcodes species of Oriental region

The eight species hitherto recorded from this region are: *angustimarginatus* Brunetti, *fuscus* Brunetti, *lineatus* Brunetti, *marginifasciatus* Brunetti, *octomaculatus* Brunetti, *respersus* Séquy, *rufomarginatus* Brunetti and *sexmaculatus* Brunetti. All of these species except the Chinese *respersus* were described from either India or Ceylon. The name *octomaculatus* Brunetti is herein synonymized with *guttatus* Costa (see discussion under *guttatus*). To this list of

species can now be added two new ones, *orientalis* from Cambodia and *philippinensis*, making a total of 10 species known for this area.

***Ogcodes* (*Ogcodes*) *angustimarginatus* Brunetti**

Oncodes angustimarginatus Brunetti, Fauna British India, vol. 1, p. 171, 1920.

Type locality: Ceylon.

Discussion: Species group unknown. According to a letter from Dr. B. P. Pal dated May 5, 1954, the type specimen of this species is in the National Pusa Collection at the Indian Agricultural Research Institute in New Delhi, India, and not in the British Museum as stated by Brunetti (1920, p. 171). A colored drawing of this type specimen was prepared for my study, and from this figure an entirely new species concept is deduced. This drawing shows the mesonotum to have a light brown ground color with three distinct black vittae, whereas Brunetti (1920, p. 171) stated: "*Thorax* moderately shining black, covered with moderately short, rather dense, brownish yellow pubescence; scutellum similar." Then at the end of his description he stated: "Described from a single specimen in the British Museum from Pirivipancheram, Ceylon, 21. i. 1892 (*Col. Yerbury*)." A note added: "Only example seen; at top of hill, found near form of a sambur. A second specimen from Pusa, 6. xii. 1911, with the thorax all black." This last statement infers that the type specimen had a differently colored thorax, and I interpret the thorax as being vittate as shown by the drawing of the type specimen. In this connection, I have assumed that somehow the type specimens of *angustimarginatus* and *octomaculatus* were mixed up, and that the figure of the thorax of *octomaculatus* by Brunetti (1920, pl. 2, fig. 28) is in reality that of *angustimarginatus* (see also the discussion under *guttatus*).

According to the drawing of the type on hand, veins M_1, r-m and m-cu are absent and the general body color is brown instead of black, but the narrow abdominal fasciae are about as described by Brunetti.

***Ogcodes* (*Ogcodes*) *respersus* Sèguy**

Oncodes respersus Sèguy, Mus. Heude, vol. 2, p. 175, 1935.

Type locality: Tchen-kiang, Kiangsu Province, China (♀).

Discussion: This species probably belongs in group v, judging from the description and the resemblance to both *orientalis*, new species, and *philippinensis*, new species. Sèguy did mention, however, that the terminal antennal segment had two minute setae on the apex, and this is a character not common to the group. He did not mention the wing venation and the type female was not available for study.

***Ogcodes (Ogcodes) orientalis*, new species**

PLATE FIGURES 20, 38, 112

Species of group v.

MALE: Length of entire specimen 4.60 mm., wing length 3.88 mm.

Head with eyes, antenna, and oral region light brown, occiput and frons dark brown; antenna with long slender style, about as long as distitarsus, frons hardly swollen, oral area nearly V-shaped behind.

Thorax covered with golden pile and dark brown except for light brown to white narrow lateral margin of mesonotum, upper one-half of postalar callus, a pair of prescutellar (mesonotal) spots, upper one-half of metanotum, and large pleural area below wing base; legs slender, yellow except for dark brown coxae, trochanters, knees, and tarsal apices; hind femur longer than hind tibia, swollen distally to nearly twice the width at apex of trochanter; wing slightly browned, vein M_1 present, longer than R_{4+5}, crossvein r-m nearly vertical, crossvein m-cu a very faint crease, vein M_2 short, curved and strong, veins Cu_2 and anal well separated near hind margin (pl. 4, fig. 20), squama semitransparent, light brown, narrow margin and basal area dark brown; halter with dark brown knob, stem light brown.

Abdomen with rather narrow posterior white fasciae on tergites, dark brown except for large whitish brown mesolateral spots on tergites II and III; tergites II and III raised in middle to form slight swellings; abdominal pile short, golden brown, more dense and browner on swellings and sparse on tergites IV–VI; venter mostly white, sternites I and narrow lateral and anterior margins of II–VI dark brown; entire venter slightly pilose.

Genitalia dark brown, large, median plate about twice as long as wide in lateral view, about 1.6 times "wingspread"; "wings" short, pointed, basal cell incomplete, about twice as wide as high (pl. 13, fig. 112); aedeagus with apex rounded and somewhat narrowed (pl. 7, fig. 38).

FEMALE: Unknown.

HOLOTYPE: Male, Angkor, Cambodia, Feb. 21, 1928 (W. P. Cockerell, USNM 64440).

REMARKS: This species represents the first record of the genus from Indonesia. Its closest relatives appear to be *respersus* and *philippinensis*, but it differs from both in having tergites II and III swollen in the middle and is distinguished from the latter by the male genitalia (compare pl. 7, figs. 37 and 38, pl. 13, figs. 99 and 112). It also differs from *respersus* in having the hind femur swollen instead of the hind tibia.

***Ogcodes (Ogcodes) philippinensis*, new species**

PLATE FIGURES 37, 99

Species of group v. This species is closely related to *orientalis*, new species, from which it differs as follows:

MALE: Length of entire specimen 6.30 mm., wing length 5.25 mm.

Head black, only eyes dark brown; antenna somewhat shorter, oral area more U-shaped behind.

Thorax with mesonotal margin dark brown, entire mesonotum nearly black, postalar callus dark brown; venation as in plate 4, figure 20, except M_4 more gently curved at junction of m-cu crossvein; squama a darker brown.

Abdomen with dorsal spots yellow, larger, and with distinct dark brown spiracular spots on tergites II–IV, tergites II and III without medial swellings, dorsal pile all about equal length; venter yellow instead of white.

Genitalia with wing of equal width throughout, somewhat broadened at apex, median plate only about 1.15 times wingspread, its basal cell more triangular (pl. 13, fig. 99); aedeagus somewhat more swollen apically (pl. 7, fig. 37).

FEMALE: Unknown.

HOLOTYPE: Male, Sibuyan Island, Philippine Islands (C. F. Baker, USNM 64441).

REMARKS: This is apparently the first recorded species of *Ogcodes* from the Philippine Islands. Its closest relative is *orientalis*, as discussed above. Both show a relationship to *basalis* (Walker) from Australia, which suggests a Malaya-Australia-Philippines distribution.

Ogcodes species of Palaearctic subregion

Since Pleske (1930) and Sack (1936) have reviewed the Palaearctic species, only pertinent notes and synonymy of those species seen will be given here. The key presented by Sack (1936, p. 16) is quite usable. The 13 species included in his review are as follows: *etruscus* Griffini, *formosus* Loew, *fumatus* Erichson, *gibbosus* (Linnaeus), *guttatus* Costa, *hirtus* Sack, *jacutensis* Pleske, *nigripes* (Zetterstedt), *nigritarsis* Shiraki, *pallipes* Latreille, *trifasciatus* Shiraki, *varius* Latreille, and *zonatus* Erichson. Species not included in this work are *limbatus* Bigot and *varius* var. *siberiensis* Brunetti, as well as three subsequently described species, *nigritarsis* var. *obusensis* Ôuchi, *esakii* Ôuchi (1942), and *reginae* Trojan (1956). This makes a total of 18 species now known for this region.

O. trifasciatus Shiraki (1932) is preoccupied by *trifasciatus* Meijere (1915), and I propose *shirakii*, new name, for *trifasciatus* Shiraki at this time. (See also data in list of species, p. 316.)

Ogcodes (*Ogcodes*) *zonatus* Erichson

PLATE FIGURE 71

Ogcodes zonatus Erichson, Entomographien, vol. 1, p. 170, 1840.
Okcodes zonatus, Schiner, Verh. Zool.-Bot. Ges. Wien, vol. 15, p. 989, 1865.
Oncodes zonatus, Kertesz, Cat. Dipt., vol. 4, p. 20, 1909.—Wandolleck, Einleit, Inflatae, figs. on pls. 2 and 4, 1914.—Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 594, 1926.—Sèguy, Fauna France, vol. 13, p. 168, 1926.—Pleske, Konowia, vol. 9, p. 166, 1930.—Sack, Die Fliegen, vol. 98, p. 23, 1936.

TYPE LOCALITY: Germany.

DISCUSSION: Species of group II. According to Pleske (1930) this species is widespread, reaching from Mongolia to Europe and south into North Africa, though it is as yet unknown from Scandinavia. This may be a Holarctic species as it seems very possible that *eugonatus* Loew is a synonym (see discussion under the latter). The possibility that *nigripes* (Zetterstedt) is merely the melanic form of *zonatus* is also discussed under *eugonatus*, and to briefly summarize, it appears to me that *melampus* Loew, *eugonatus* Loew, and *nigripes* (Zetterstedt) are all possibly color forms of *zonatus* Erichson. *O. zonatus* is also more closely related to *caffer* Loew than to any western Palaearctic species known to me.

SPECIMENS EXAMINED: 5 ♂, 2 ♀.

GERMANY: 1 ♂, Nurnberg (Lichtwardt, EIS).
SWITZERLAND: 2 ♂, 2 ♀, St. Mortiz, July 27, 1902 (Oldenberg, EIS) [det. by P. Sack].
HUNGARY: 2 ♂, without other data (EIS).

Ogcodes (*Ogcodes*) *nigripes* (Zetterstedt)

Henops nigripes Zetterstedt, Ins. Lapponica, p. 574, 1838.
Oncodes nigripes, Kertesz, Cat. Dipt., vol. 4, p. 19, 1909.—Verrall, Brit. Flies, vol. 5, p. 463, 1909.—Pleske, Konowia, vol. 9, p. 166, 1930.—Sack, Die Fliegen, vol. 98, p. 20, 1936.

TYPE LOCALITY: Lapponia Umensi (Sweden).

DISCUSSION: Species of group II. This species has been recorded only from Scandinavia, but, on the basis of specimens before me, this form occurs also in the Swiss Alps. These specimens are from St. Moritz, Switzerland, July 27, 1902 (Oldenberg, EIS, DEI), and were mixed with other specimens from the same locality determined by Sack as *zonatus* Erichson. In comparing these with specimens of the Nearctic *melampus* Loew, no morphological differences were found, and *melampus* specimens fit the descriptions of *nigripes* given by Sack (1936, pp. 16, 20) and Zetterstedt (1838). For a further discussion of these species' relationships, see the notes under *eugonatus* Loew.

***Ogcodes (Ogcodes) pallipes* Latreille**

PLATE FIGURES 51, 76, 86

Ogcodes pallipes Latreille, Encyclop. Method., vol. 7, p. 471, 1811.

Henops marginatus Meigen, Syst. Beschr., vol. 3, p. 100, pl. 24, fig. 30, 1822 (not Cole, 1919).

Oncodes pallipes, Kertesz, Cat. Dipt., vol. 4, p. 19, 1909.—Verrall, Brit. Flies, vol. 5, p. 466, 1909.—Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 594, 1926.—Sèguy, Fauna France, vol. 13, p. 167, 1926.—Pleske, Konowia, vol. 9, p. 166, 1930.—Sack, Die Fliegen, vol. 98, p. 21, 1936.

TYPE LOCALITY: Europe.

DISCUSSION: This species is apparently a member of group III. It seems to be restricted to Europe and western Asia and is not yet recorded from North Africa. The Nearctic species *borealis* Cole is apparently its nearest relative, and these two species are the only known representatives of group III. The females of *pallipes* superficially resemble both *zonatus* Erichson and *gibbosus* (Linnaeus), but *pallipes* is the only one of the three with crossvein m-cu present. The male genitalia show similarity to those of *borealis* but at the same time are quite distinct (see pl. 8, fig. 51; pl. 11, fig. 76; pl. 12, fig. 86).

SPECIMENS EXAMINED: 5 ♂, 10 ♀.

FRANCE: 1 ♂, 5 ♀, Ruiel S. et Oise, July 7, 1952 (H. L. Parker, USNM, EIS); 4 ♂, 3 ♀, Escragnoles Alpes, Eur. Par. Lab., #5498-3, ex. *Crabro* nest (USNM, EIS).

GERMANY: 1 ♀, Dessau (Oldenberg, EIS).

HUNGARY: 1 ♀, without other data (FRC).

***Ogcodes (Ogcodes) guttatus* Costa**

PLATE FIGURES 6, 22, 66, 81, 91

Ogcodes guttatus Costa, An. Sci. Napoli, vol. 1, p. 80, 1854.

Oncodes benacensis Pokorny, Verh. Zool.-Bot. Ges. Wien, vol. 37, p. 389, p. 7, fig. 3, 1887.

Oncodes octomaculatus Brunetti, Rec. Indian Mus., vol. 7, p. 476, 1912; Fauna British India, vol. 1, p. 170, fig. 13, and pl. 2, figs. 28 (abdomen only), 29, 1920; Ann. Mag. Nat. Hist., vol. 18, p. 591, 1926. New synonymy.

Oncodes guttatus, Pleske, Konowia, vol. 9, p. 164, 1930.—Sack, Die Fliegen, vol. 98, p. 19, 1936.

TYPE LOCALITY: Italy: *guttatus*, *benacensis*. India: *octomaculatus*.

DISCUSSION: Species of group II. This rather uniquely patterned species has been recorded only from southern Europe. It is now known to occur in the Ethiopian and Oriental regions as well but is apparently only rarely encountered. Its distribution from Italy through Greece to Turkey and Persia to southeast India is fairly continuous, but the South African record cited below indicates a much wider range.

O. guttatus is related to and perhaps synonymous with *distinctus* Brunetti and *nyasae* Brunetti. Its wing venation (pl. 3, fig. 6) suggests placement in the *colei* group, but the male genitalia gives much evidence in support of my placing it in the *eugonatus* group (see pl. 10, fig. 66; pl. 11, fig. 81; pl. 12, fig. 91). It would also be plausible to set *guttatus* apart as a separate group intermediate between the *eugonatus* and *colei* groups.

Brunetti (1912) described *octomaculatus* from two male specimens from Igatpuri, Western Ghats, Bombay Presidency, India, Nov. 20, 1909 (Annandale), and stated that the types were in the Indian Museum, but he gave no figures at that time. In 1920 he redescribed the species and named a new species from India which he called *angustimarginatus*, but in this paper he figured only *octomaculatus*. Through the courtesy of Dr. B. P. Pal of the Indian Museum, beautiful colored drawings of the types of these two species were made available to me. It is now apparent that Brunetti's (1920, vol. 1, p. 170, pl. 2, fig. 28) figure of *octomaculatus* is a composite, in which the thorax represents *angustimarginatus* and the abdomen and wing represent *octomaculatus*. How this occurred I do not know, unless the specimen he drew (or rather had drawn for him) was actually parts of two specimens of the two species which had been glued together. At any rate, *octomaculatus* appears to be conspecific with *guttatus*. The male specimen cited below from South Africa was compared with males of *guttatus* from Turkey and Greece and is surely conspecific.

NEW DISTRIBUTION RECORDS:

GREECE: 1 ♂, Mt. Pelion, July (G. Pandazis, USNM).

SOUTH AFRICA: 1 ♂, Mitchell's Pass, 100 miles from Cape Town, Dec. 1–5, 1930 (H. W. Simmonds, BMNH).

TURKEY: 1 ♂, Constantinople, June 29 to July 4, 1925 (Miss G. Edwards, BMNH).

Ogcodes (*Ogcodes*) *hirtus* Sack

PLATE FIGURES 12, 26, 31, 54

Oncodes hirtus Sack, Die Fliegen, vol. 98, p. 20, pl. 2, fig. 8, 1936.

TYPE LOCALITY: Kurdistan, Iran (1♀, Dahlemer Museum).

DIAGNOSIS: Species of group IV.

MALE: Length of entire specimen 3.30 mm., wing length 3.00 mm.

Head with reddish brown eyes, black occiput, dark brown protruding frons, light brown antennal-oral region; antenna light brown except dark brown style which is rather short, somewhat swollen along basal one-half, with 2–3 minute setae on apex; yellow pubescence on occiput short, long on oral region.

Thorax entirely shining black covered with long whitish brown pile, about twice as long as tarsal claw; metanotum quite prominent;

legs yellow except for black coxae, dark brown femora, and light brown tarsal apices; claws nearly black; wing hyaline, veins white, indistinct, but venation strong (pl. 3, fig. 12); vein M_1 absent except distal portion, r-m crossvein present, straight, nearly reaching M_4, m-cu crossvein strong, M_2 long, reaching wing margin; squama transparent, margin concolorous, halter knob black, stem white.

Abdomen long, narrow, distinctly arched with large dorsomedian, bituberculate swellings on tergites II–IV (pl. 5, fig. 26); tergites I–II mostly brownish black, with faintly indicated posterior white fasciae; tergites III–V with irregular brown and white pattern, rather similar to that shown by Sack (1936, fig. 8), the tubercles mostly brown as is anterior margin of each tergite, creamy white markings dominate laterally and behind; dorsum along midline including tubercles covered with long white silky pile, each hair somewhat browned at base, large lateral area with short, whitish yellow pubescence; sternites mostly dark brown with narrow posterior white fasciae, II–III with large white lateral spots, entire sternum covered with short white pile except for bare I.

Genitalia (pl. 6, fig. 31) minute, light brown, cercus nearly white in spots; aedeagus long, thin, with definite apical notch (pl. 9, fig. 54); ejaculatory apodeme small, narrow, with "wings" indistinct, "wingspread" about equal to greatest width of aedeagus.

Discussion: Apparently this species is still known only from the unique female type. For this reason the above description of the male seems necessary, though it is possible that the male described above is actually another closely related species. Such distinctive features as the tuberculate abdomen, and possibly different wing venation were not found in the female, but the former feature is true in many species of the genus, while the latter character is usually vague in descriptions.

The male genitalia and tuberculate abdomen of *hirtus* suggests a relationship to *guttatus;* however, the long body pile, two or more antennal setae, and male genitalic structures show it belongs in the *colei* group. Judging from its original description *hirtus* may be related to *formosus* Loew.

Specimen examined:

Iran: 1 ♂, Sharaf Khaneh, Sept. 5, 1949 (Richard P. Dow, USNM).

Ogcodes (*Ogcodes*) *varius* Latreille

Plate figures 47, 109

Ogcodes varius Latreille, Encyclop. Method., vol. 8, p. 471, 1811.
Henops limbatus Meigen, Syst. Beschreib., vol. 3, p. 100, 1822.
Henops apicalis Meigen, Syst. Beschreib., vol. 3, p. 101, 1822.
Ogcodes fuliginosus Erichson, Entomographien, vol. 1, p. 172, 1840.

Oncodes varius, Kertesz, Cat. Dipt., vol. 4, p. 20, 1909.—Verrall, Brit. Flies, vol. 5, p. 462, 1909.—Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 602, 1926.—Sèguy, Fauna France, vol. 13, p. 168, 1926.—Pleske, Konowia, vol. 9, p. 165, 1930.—Sack, Die Fliegen, vol. 98, p. 22, 1936.

TYPE LOCALITY: Europe.

DISCUSSION: Species of group v. This European species may extend east to Siberia as variety *siberiensis* Brunetti (1926, p. 603), and south to British East Africa and the Belgian Congo as variety *pallidimarginalis* Brunetti (1926, p. 602). However, it is also quite possible that both of these varieties are distinct species which are not closely related to *varius*.

The extremely restricted Nearctic species *rufoabdominalis* Cole is rather closely related to *varius* and suggests a Holarctic connection. However, they are easily separated by color characters and the male genitalia (see discussion under *rufoabdominalis*), In male genitalia, as well as color pattern, *varius* also shows definite similarities with the Australian *basalis* (compare pl. 13, figs. 101, 109).

The European species *cingulatus* Erichson appears to be conspecific with *varius*, but Sack (1936, p. 23) did not make the synonymy even though he examined the type of the former species.

SPECIMENS EXAMINED: 4 ♂, 3 ♀.

GERMANY: 2 ♂, 1 ♀, Berlin, Jungfernheide, July 4, 28, 1901 (Oldenberg, EIS); 1 ♀, Schlesien (Letzner, EIS).

HUNGARY: 1 ♂, Budapest (Oldenberg, EIS); 1 ♂, without other data (FRC).

CORSICA: 1 ♀, Vizzavona, July 13 to Sept. 5, 1931 (M. E. Mosely, BMNH).

Ogcodes (*Ogcodes*) *gibbosus* (Linnaeus)

PLATE FIGURES 13, 43, 111

Musca gibbosa Linnaeus, Syst. Nat., vol. 10, p. 593, 1758.

Henops leucomelas Meigen, Klassif., vol. 1, p. 151, pl. 8, fig. 30, 1804.

Oncodes gibbosus, Kertesz, Cat. Dipt., vol. 4, p. 18, 1909.—Verrall, Brit. Flies, vol. 5, p. 463, 1909.—Brunetti, Ann. Mag. Nat. Hist., vol. 18, p. 594, 1926.—Sèguy, Fauna France, vol. 13, p. 167, 1926.—Pleske, Konowia, vol. 9, p. 166, 1930.—Sack, Die Fliegen, vol. 98, p. 18, 1936.

Ogcodes gibbosus, Sabrosky, Amer. Mid. Nat., vol. 39, p. 408, 1948.

TYPE LOCALITY: Europe.

DISCUSSION: Species of group v. This widely distributed Palaearctic species apparently has no close Nearctic relative with the possible exception of *hennigi*, new species. Pleske (1930, p. 166) recorded it from the Siberian Orient, and while it appears to be rather common in northern and central Europe it has not been recorded from the Mediterranean region to my knowledge.

The aedeagus of *gibbosus* (pl. 8, fig. 43) is quite similar to that of the Nearctic *sabroskyi*, new species, and of *boharti*, new species; however, except in this feature *gibbosus* does not appear to be closely related.

Specimens examined: 2 ♂, 9 ♀.

Belgium: 3 ♀, Sutendaal, June 17, 1919 (USNM).
Germany: 1 ♂, Potsdam, July 5, 1922 (Oldenberg, EIS); 1 ♂, Frankfurt, Gulde, June 24, 1908 (Offenbach, EIS); 1 ♀, Kolkhorst, July 25, 1888 (EIS); 1 ♀, Berlin, Grunervld., June 15, 1894 (Lichwardt, EIS); 1 ♀, Munchen, July 10, 1911 (EIS); 2 ♀, Uckeritz-Usedom, June–July, 1936 (R. Korschefsky, EIS).
Russia: 1 ♀, Araxesthal, Kaukasus, May 13, 1892 (Reitt, VNM).

Ogcodes species of Nearctic subregion

Thirteen species of the genus *Ogcodes* have been described from this subregion that are now considered valid: *albiventris* Johnson, *borealis* Cole, *colei* Sabrosky, *dispar* (Macquart), *dusmeti* Arias, *eugonatus* Loew, *floridensis* Sabrosky, *melampus* Loew, *niger* Cole, *pallidipennis* Loew, *rufoabdominalis* Cole, *shewelli* Sabrosky and *vittisternum* Sabrosky. *O. albiventris* is hereby removed from the subgenus *Ogcodes* to form the type of the new subgenus *Neogcodes*, while the addition of five new species—*adaptatus*, *boharti*, *canadensis*, *hennigi* and *sabroskyi*—brings the total number of known species to 18. These species represent four of the six species groups known for the world, with only the *porteri* and *brunneus* groups being absent.

The distribution of *Ogcodes* in the central Nearctic area is shown in text figure 4. The unlined parts (Upper and Lower Sonoran Zones) show a paucity of records indicating that these species are obviously more Transitional and Boreal in their distributions. Typical species distributional patterns are given for several of the more common species (text figs. 5–9).

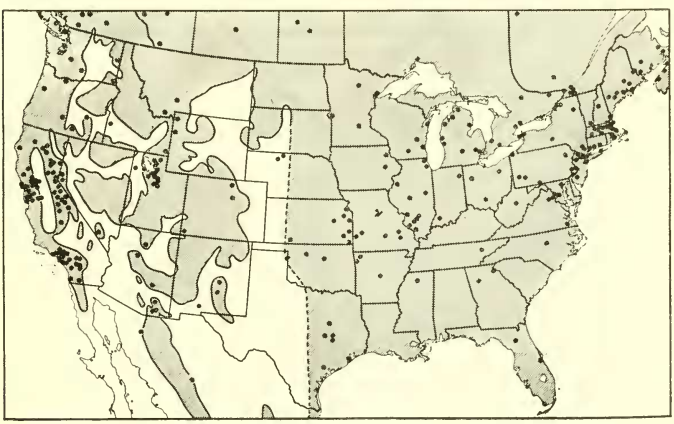

Figure 4.—Distribution of the genus *Ogcodes* in the United States.

Rather than attempt to make individual keys to the *Ogcodes* species of North and South America, it was felt that one key would be more practical, particularly since it now seems very possible that a few species may be found to occur in both areas. Parts of this key were adapted from Sabrosky (1948), and although the key was made primarily for males, females of most species will key out. Females of the following species are unknown: *chilensis* Sabrosky, *floridensis* Sabrosky, *porteri* Schlinger, *shewelli* Sabrosky, *triangularis* Sabrosky, and the new species *boharti, brasilensis, canadensis, colombiensis, hennigi,* and *sabroskyi.* Males are unknown for *niger* Cole.

Key to the American species of *Ogcodes* Latreille

1. Vein M_1 present and distinct throughout its length, usually attached basally to the stub or r-m crossvein (pl. 3, fig. 6) 2
   Vein M_1 absent, or present only as a crease, or possibly veinlike in the distal portion (pl. 3, figs. 9, 12; pl. 4, figs. 16–19) 18
2. Crossvein m-cu present and distinct, though sometimes faint in its approach to vein M_4 3
   Crossvein m-cu absent 8
3. Abdominal tergites dark brown to black with light brown to white posterior fasciae (about as in pl. 5, fig. 29); r-m crossvein present or absent . . . 4
   Abdominal tergites with white or yellow spots in addition to posterior fasciae; r-m crossvein absent 5
4. Body ground color black; antenna whitish; r-m crossvein absent; only female holotype known (Utah) . . . . . **niger** Cole
   Body ground color brown; antenna brown; r-m crossvein present; aedeagus as in pl. 9, fig. 56 (Canada and northern United States) . **borealis** Cole
5. Abdominal venter with three rows of blackish brown spots composed of a large subquadrate median spot and a lateral spot on each sternite except 1, which is entirely black; abdominal pile scarce and quite browned; aedeagus as in pl. 10, fig. 63 (Oregon and Washington). . . . **vittisternum** Sabrosky
   Without the above combination of characters 6
6. Second tergite entirely yellow, the third and fourth tergites with three brown spots, the fifth and sixth almost entirely shining brown; abdominal venter mostly bright yellow including sternite 1; aedeagus about as in pl. 10, fig. 63 (Florida) . . . . . **floridensis** Sabrosky
   Second to fourth tergites each with large median spot; venter mostly white. 7
7. Second to fourth tergites each with a median triangular black spot; femora and tibiae bright yellow; aedeagus as in pl. 10, fig. 62 (eastern Canada and New York) . . . . . **shewelli** Sabrosky
   Second to fourth tergites each with a broad subquadrate black spot; femora infuscated basally; aedeagus as in pl. 10, fig. 64 (Arizona and California). **colei** Sabrosky
8. Mesonotal disc with stripes or patterned, or if not striped, then ground color dark orange, light brown or yellow 9
   Mesonotal disc not patterned, ground color black 11
9. Spiracular area usually as dark brown spots contrasting with lighter colored tergites; abdomen orange to light brown with white or brownish white

posterior fasciae on tergites; meosnotal disc with or without indications of one to three longitudinal stripes; aedeagus as in pl. 7, fig. 35 (United States south to Costa Rica) . . . . . **dispar** (Macquart)

Spiracular area concolorous with tergites; abdomen dark or light brown, not orange (South American species) 10

10. Mesonotal disc dark brown with black median stripe and a black lateral stripe which widens and recurves forward near postalar callus; abdomen of nearly uniform blackish brown with distinct posterior white fasciae; tergite II distinctly raised so as to nearly conceal view of metanotum; aedeagus as in pl. 7, fig. 40 (Colombia) . . . **colombiensis,** new species

Mesonotal disc light brown with three dark brown longitudinal stripes, median one complete, lateral one reaching from postalar callus to little beyond wing base, straight; abdomen mostly light brown, darker brown near each tergal fascia and on anterior one-half of each sternite; tergite II not raised, metanotum clearly visible, abdomen long and slender; aedeagus as in pl. 8, fig. 50 (Brazil) . . . . . **brasilensis,** new species

11. Dorsum of abdomen reddish orange with median row of broadly triangular black or brown spots; aedeagus as in pl. 7, fig. 34 (Utah).

rufoabdominalis Cole [also **dusmeti** Arias, from Mexico]

Dorsum of abdomen about as in pl. 5, fig. 29, with even fasciae 12

12. General habitus brown; humerus and postalar callus light to dark brown; scutellum rarely all black; aedeagus as in pl. 7, fig. 36 (Canada south to Costa Rica) . . . . . **pallidipennis** Loew

General habitus black; humerus, postalar callus and scutellum black . . . 13

13. Abdominal tergites black with very narrow posterior white fasciae covering about one-fifth to one-sixth of each segment 14

Abdominal tergites black or dark brown with the wide posterior white fasciae covering about one-fourth to one-third of each segment 15

14. Thoracic pile short, golden yellow; sternites II–IV with posterior white fasciae expanded medially; squama evenly infuscated; ejaculatory apodeme as in pl. 13, fig. 107; aedeagus as in pl. 8, fig. 44 (Georgia).

sabroskyi, new species

Thoracic pile short, whitish yellow; sternites II–IV with posterior white fasciae of even width; squama opaque white except for dark brown circular spot covering basal one-third; ejaculatory apodeme as in pl. 13, fig. 105; aedeagus as in pl. 8, fig. 49 (Canada) . . . . . **canadensis,** new species

15. Legs mostly black 16

Legs mostly brown 17

16. Abdominal sternites I and much of II mostly black; abdominal tergites with posterior white fasciae covering about one-fourth of each segment; eyes black; r-m crossvein distinct; ejaculatory apodeme as in pl. 6, fig. 32; aedeagus as in pl. 7, fig. 41 (western North America).

adaptatus, new species

Abdominal sternites I and one-half of II mostly white; abdominal tergites with posterior white fasciae covering about one-third of each segment; eyes brown; r-m crossvein indistinct; ejaculatory apodeme as in pl. 13, fig. 100; aedeagus as in pl. 8, fig. 45 (New York) . . **hennigi,** new species

17. Abdominal tergites with posterior white fasciae enlarged medially; legs mostly dark brown, tibiae light brown, apices of tarsi black; r-m crossvein absent; ejaculatory apodeme as in pl. 13, fig. 103; aedeagus as in pl. 7, fig. 39 (Argentina) . . . . . **argentinensis,** new species

Abdominal tergites with rather even posterior white fasciae; legs dark brown, only apical three-fourths of femora and knees light brown; r-m crossvein present; ejaculatory apodeme as in pl. 13, fig. 104; aedeagus as in pl. 7, fig. 42 (Arizona) . . . . . **boharti,** new species

18. Species with common *Ogcodes* pattern (pl. 5, fig. 29). 19
Species with abdomen patterned in various ways, but not only with simple fasciae (pl. 5, fig. 30) 23

19. Crossvein m-cu present; abdomen almost entirely black; only female holotype known (Utah) . . . . . **niger** Cole
Crossvein m-cu absent 20

20. Thorax black to reddish black; humerus and postalar callus yellow to orange (Chile) . . . . . **chilensis** Sabrosky
Thorax black; humerus and postalar callus usually black or dark brown . 21

21. Legs pale brownish yellow except for black coxae; aedeagus as in pl. 9, fig. 56 (Canada and northern United States) . . . . . **borealis** Cole
Legs usually dark brown or black, if lighter colored, then at least basal two-thirds of femora infuscated 22

22. Legs black, except knees narrowly orange or brown; abdominal tergal posterior white fasciae usually narrow, covering about one-third of each segment; aedeagus about as in pl. 11, fig. 73 (northwestern America; United States to Alaska) . . . . . **melampus** Loew
Legs brown to deep yellow, usually basal two-thirds of femora, basal one-fourth of tibiae, and all tarsi somewhat infuscated; abdominal tergal posterior white fasciae narrow (in most females) to wide (in most males), sometimes as wide as two-thirds length of each segment; aedeagus as in pl. 11, fig. 73 (Canada to southern Mexico) . . . . . **eugonatus** Loew

23. Veins M_2 and M_4 absent (Chile) . . . . . **porteri** Schlinger
Veins M_2 and M_4 present 24

24. Crossvein m-cu absent; abdomen mostly white with scattered brown spots (pl. 5, fig. 30) (California, British Columbia, Michigan, and Ontario). **albiventris** (Johnson)
Crossvein m-cu present (Chilean species) 25

25. Vein M_1 (although absent in the strict sense) appears to be present as a strong crease and veinlike apically; abdominal pile predominantly black; tergites III–V black on posterior halves; aedeagus as in pl. 9, fig. 59 (Juan Fernandez Islands, Chile) . . . . . **kuscheli** Sabrosky
Vein M_1 entirely absent; abdominal pile whitish yellow; tergites III–IV with large brown triangular spots, the yellow lateral areas to these triangles intersecting them and the lateral brown spots at the posterior margins (Chile) . . . . . **triangularis** Sabrosky

Subgenus *Ogcodes* Latreille

Ogcodes (*Ogcodes*) *eugonatus* Loew

PLATE FIGURES 18, 73, 78, 94

Oncodes eugonatus Loew, Berliner Ent. Zeit., vol. 16, p. 60, 1872.

Ogcodes eugonatus, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 62, 1919.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 394, 1944; Amer. Mid. Nat., vol. 39, p. 426, pl. 2, figs. 12, 15, and 21, 1948.

Ogcodes pallidipennis, Cole, in part, Trans. Amer. Ent. Soc., vol. 45, p. 64, 1919 (not Loew, 1872).

Ogcodes marginatus Cole, Trans. Amer. Ent. Soc., vol. 45, p. 67, pl. 15, fig. 42, 1919 (not Meigen, 1822).

Ogcodes albicinctus Cole, Psyche, vol. 30, p. 47, 1923 (new name for *marginatus* Cole, not Meigen).—James, Journ. Kansas Ent. Soc., vol. 11, p. 29, 1938.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 392, 1944; Amer. Mid. Nat., vol. 39, p. 425, pl. 2, fig. 21, 1948. New synonymy.

Ogcodes albicincta, Cole, Proc. California Acad. Sci., ser. 4, vol. 16, p. 422, figs. 81, 90, 1927 (lapsus).

Diagnosis: Species of group II with typical *Ogcodes* pattern (pl. 5, fig. 29); vein M_1, although usually completely absent, is sometimes faintly present basally (pl. 4, fig. 18); thorax black, sometimes females with brown markings on humerus, scutellum, postalar callus, and pleurites; legs vary from dark to light brown with only coxae black, tibiae usually dark brown; male genitalia as shown in plate 11, figure 78, plate 12, figure 94 (ejaculatory apodeme), and plate 11, figure 73 (aedeagus).

Type locality: Texas (♂, Belfrage, MCZ).

Distribution: This is a widespread species ranging from southern Mexico to Canada. It is apparently adapted primarily to the Sonoran and Transition Zones, and is more common at the lower elevations (see text fig. 5).

Recorded distribution: About 200 specimens have been listed from the following areas: Alberta, Arkansas, California, Colorado, Illinois, Indiana, Kansas, Maine, Massachusetts, Michigan, Missouri, Mexico (Morelos), Montana, New Jersey, New York, Ohio, Oklahoma, Ontario, Texas, Utah, Virginia, Washington D.C., West Virginia, and Wyoming. All records west of the Rocky Mountains were given as *albicinctus* Cole.

New distribution records: (157 specimens, 86♂, 71♀.) Because of the large number of recorded specimens, only those new ones of special importance and new state records are cited here.

Arizona: 1♀, Coconino Co., Aug. 13, 1947 (R. H. Beamer, UK); 1♀, Phelps Bot. Area, White Mts. (A. and H. Dietrich, CU).

British Columbia: 1♂, Smithers, July 17, 1949 (P. R. S., BC); 1♂, Lytton, June 20, 1931 (G. J. Spencer, BC); 1♀, Cultus Lake, July 6, 1948 (H. R. Foxlee, CNM).

California: 11♂, Morongo Valley, San Bernardino Co., Apr. 19, 1951 (E. I. Schlinger, EIS), 3♂, same data (E. J. Taylor, EIS), 5♂, same data (R. C. Bechtel, EIS, DEI); 3♂, 2♀, same locality, June 18, 1951 (R. C. Bechtel, CIS, EIS, INHM); 1♀, Putah Canyon, Yolo Co., Aug. 20, 1952 (J. K. Traub, EIS); 7♂, La Mesa, San Diego Co., Jan. 23, 1953 (taken from *Crabro* nest, F. X. Williams, CAS, EIS).

Connecticut: 1♀, Pine Orchard in Branford, July 26, 1904 (H. L. Viereck, CAES); 1♂, New Haven, July 13, 1904 (P. L. Butrick, CAES); 1♀, Indian Neck, Branford, July 22, 1932 (reared by B. J. Kaston, CAES) [det. by Curran and recorded by Kaston, 1937, as *O. pallidipennis* Loew].

MANITOBA: 2♂, 2♀, Aweme, July 11, 1922 and July 3, 1923 (R. M. White, CNM); 3♀, Aweme, June 26, 1911 and July 20, 1911 (N. Criddle, PANS).

MEXICO: 1♀, Baja California, Johnson Ranch, May 7, 1938 (W. E. Simmonds, EIS); 1♀, Chiapas, 6 miles southwest of Arriaga, sea level, Aug. 12, 1952 (C. D. MacNeill, CIS).

MONTANA: 1♀, Kalispell, June 13, 1920 (BMNH).

NEBRASKA: 1♂, 1♀, Cherry Co., Aug. 22, 1945, on fire tower (D. Gates, UN); 1♂, 30 miles south of Valentine, June 9, 1950 (Slater, Hicks, Laffoon, EIS).

NEVADA: 1♀, Charleston Mts., Willow Creek Camp, July 1, 1954 (E. I. Schlinger, CIS).

NEW MEXICO: 1♂, Ruidosa, June 26, 1940 (L. C. Kuitert, EIS); 1♀, Beien, Aug. 19, 1927 (L. D. Anderson, UK); 1♂, Corona, June 8, 1950 (L. D. Beamer, UK).

NEW YORK: 1♂, Orient, Long Island, July 4, 1907 (R. Latham, AMNH).

QUEBEC: 1♂, 1♀, Rupert House, July 10, 1949 (D. P. Gray, CNM).

UTAH: 1♂, Soldier Summit, June 18, 1940 (Knowlton and Harmston, USAC).

SEASONAL OCCURRENCE: From Apr. 12 (Texas) to Sept. 6 (Kansas); from Apr. 19 to Sept. 10 (California) and from Aug. 12 to Oct. 28 (southern Mexico).

RECORDED HOSTS: *Pardosa distincta* (Blackwall) from Ontario by Sabrosky (1948, p. 427); *Pardosa banksi* Chamberlin from Connecticut by Kaston (1937, p. 419, given as host of *pallidipennis* Loew).

NEW HOST RECORD: *Pardosa sternalis* Thorell (?), immature, collected at Quincy, Plumas County, Calif., May 6, 1950, by the author. The parasite (♀) emerged from host May 11, pupated May 13, emerged as an adult May 18, and died May 22, 1950.

BIOLOGY: Although it is a fact that the only known genus of hosts for *eugonatus* is *Pardosa* Koch, in all probability other lycosids will be found to serve as hosts as well.

Kaston (1937, p. 419) reared two specimens of *eugonatus*, gave one day as their emergence to prepupal period, and said their pupal period lasted 5–6 days. The only specimen reared by the author had similar periods of development, and the adult female lived only 4 days in captivity.

Sabrosky (1944, pp. 394–395) recorded finding a large series of adults in a neglected orchard near Beulah, Mich., in 1942–43. He said they were usually "found clinging to the underside of dead twigs on dead or dying young cherry trees . . . in no case were they taken on twigs bearing leaves." I have had only one occasion to observe this species in any numbers. This was in 1951 in tall grass bordering rather dry pasture land in Morongo Valley, Calif. (this pasture has since been burned over). Specimens were taken in open flight by net and also by sweeping the tall grass. Several specimens, all males, were collected some distance away on the trunks of large willow trees. All the specimens observed on this day (Apr. 19, 1951) were males. On June 18, 1951, R. C. Bechtel collected in this same pasture and obtained only females. This would indicate that the actual time that

both sexes occurred in this area was less than two months. Some of the females collected by Bechtel laid eggs in large gallon jars. These eggs were kept in the laboratory at 80 percent humidity and 85° F., but no larvae emerged. Apparently the one-day trip of some 24 hours without proper humidity-temperature control was enough to desiccate 100 percent of the eggs. The first-instar larva of this species is still unknown.

Specimens of this species were reported by Bechtel and Schlinger (1957) as larval provisions in the nests of a crabronid, *Ectemnius* (*Hypocrabro*) *spiniferus* Fox, near Sacramento, Calif.

Discussion: An examination of the male holotype (Wyoming) and the two male paratypes (Kansas) of *albicinctus* Cole, together with a large series of *eugonatus* (about 250 specimens) from throughout its range, indicated that *albicinctus* is merely a low-frequency color variant of *eugonatus*. Furthermore, Cole (1919) admittedly did not know *eugonatus* when he described *albicinctus* (as *marginatus* Cole). Further evidence to support this synonymy is given by the series of specimens from Morongo Valley, Calif., in which there were examples of both color forms. Also, when the male genitalia of typical *eugonatus*, typical *albicinctus*, and typical *melampus* Loew were examined in series, the slight differences noted by Sabrosky (1948) were found to occur in each of the so-called species with about the same frequency. *O. melampus* will probably be found to be a melanic color variant of *eugonatus* when more specimens can be studied (see discussion under *melampus*). The probable relationship of *eugonatus* to the Nearctic species is shown in text figure 3.

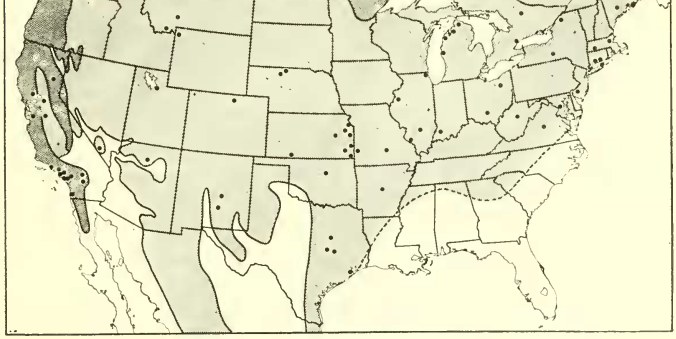

Figure 5.—Distribution of *Ogcodes eugonatus* Loew (solid circles) and *O. melampus* Loew (open circles) in the United States.

There can be little doubt that *eugonatus* is closely related to the European *zonatus* Erichson, and I am inclined to believe they are conspecific, though possibly representing geographical subspecies. Since *melampus* is related to *eugonatus* in the same way *zonatus* is to *nigripes* (Zetterstedt), and *melampus* is indistinguishable from *nigripes*, it could well be that all these "species" are subspecies or variations of *zonatus*.

Ogcodes (*Ogcodes*) *melampus* Loew

Oncodes melampus Loew, Berliner Ent. Zeit., vol. 16, p. 60, 1872.

Ogcodes melampus, Cole, in part, Trans. Amer. Ent. Soc., vol. 45, p. 61, 1919.—Cole and Lovett, Proc. California Acad. Sci., ser. 4, vol. 11, p. 239, 1921.—Sabrosky, Amer. Mid. Nat., vol. 39, p. 424, 1948.

DIAGNOSIS: Species of group II. Very similar to the preceding species except that the general habitus of *melampus* is black instead of brown and the legs are nearly all black.

TYPES: 2♂, 1♀, cotypes, California (H. Edwards, MCZ).

DISTRIBUTION: This species inhabits the Upper Sonoran and Transition Zones of California, and ranges north through Washington and British Columbia to Alaska. The Minnesota record is the only one east of the Pacific Coast, and indicates that the distribution is probably much wider than is now known (see text fig. 5).

RECORDED DISTRIBUTION: Alaska, California (Alviso, Santa Cruz Mts., Carrville), Nevada (Ormsby County), and Washington (Mt. Rainier), all recorded by Sabrosky (1948, p. 425).

NEW DISTRIBUTION RECORDS: (26 specimens, 15♂, 11♀.)

BRITISH COLUMBIA: 2♂, Midday Valley, Merritt, July 1924 (K. Ruden, BC, EIS); 1♀, Duncan, June (CNM) [homotype, compared by Curran].

CALIFORNIA: 1♂, Patterson, Stanislaus Co., Aug. 6, 1952 (W. W. Middlekauff, CIS); 2♂, San Jose, Santa Clara Co., May 20, 1947 (Wm. Hoyt, PHA); 1♂, Head of Virginia Canyon, Yosemite N.P., Aug. 4, 1939 (R. L. Usinger, CAS); 1♂, Pleasanton, Alameda Co., Aug. 31, 1932 (A. E. Michelbacher, CIS); 1♀, Base of Mt. Dana, Tuolumne Co., July 17, 1949 (L. L. Jensen, CIS); 2♂, Rio Vista, Solano Co., June 2, 1949 (R. S. Beal, EIS); 1♂, Davis, Yolo Co., May 13, 1946 (A. T. McClay, UCD); 1♀, same data, May 22, 1948 (B. Stevens, EIS); 1♀, same data, May 9, 1949 (reared, E. I. Schlinger, EIS); 1♂, Vacaville, Solano Co., Apr. 19, 1946 (A. T. McClay, UCD); 1♂, 5♀, Mountain View, Santa Clara Co., Sept. 12, 1930 (SU, EIS); 1♀, Fish Canyon, San Gabriel Mts., Los Angeles Co., June 1942 (reared, E. I. Schlinger, EIS); 1♀, Sunol, Alameda Co., May 24, 1931 (GEB); 1♂, Temecula, Riverside Co., Apr. 27, 1950 (S. F. Bailey, EIS).

MINNESOTA: 1♂, Shore of Lake Superior at Split Rock, St. Louis Co., July 1, 1935 (D. G. Denning, UM).

NEVADA: 1♂, N.W. side of Washoe Lake, Washoe Co., June 16, 1952 (E. I. Schlinger, EIS).

SEASONAL OCCURRENCE: From Apr. 19 to Nov. 12 (California), and July (Alaska).

RECORDED HOSTS: None.

New host records: (1) *Tarentula kochi* Keyserling, immature, collected at Fish Canyon, San Gabriel Mts., Calif., by the author. The parasite (♀) emerged and became an adult in June 1942. (2) *Xysticus cunctator* Thorell, immature, collected at Davis, Yolo Co., Calif., by the author. The parasite (♀) emerged from the host May 9, 1949, pupated May 11, emerged as an adult May 16, and died May 23, 1949.

Biology: Nothing has been recorded in the literature, and the only known hosts are given above.

Discussion: As mentioned above *melampus* is quite closely related to *eugonatus* and may be only its melanic form. However, since specimens of *melampus* are rare, occur in only a small part of the range of *eugonatus*, and apparently are not limited simply by climatic conditions, it does not appear possible at this time to establish the fact that synonymy may be involved. Although the two species appear to be sympatric, at least where *melampus* occurs, in no case have the two species been taken together (that is, under identical ecological conditions). In fact, *melampus* has only on few occasions been taken in association with any other *Ogcodes* species and that species, *adaptatus*, is a member of the distinctly different *pallidipennis* group.

At present *melampus* is differentiated from *eugonatus* only by its darker coloration, and is apparently indistinguishable from the northern European species, *nigripes*. For further notes see discussions under *eugonatus*, *nigripes*, and *zonatus*.

Ogcodes (*Ogcodes*) *borealis* Cole

Plate figures 7, 56, 72, 85

Ogcodes borealis Cole, Trans. Amer. Ent. Soc., vol. 45, p. 68, 1919; Psyche, vol. 30, p. 48, 1923; Proc. Ent. Soc. Washington, vol. 26, p. 182, 1924.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 393, 1944; Amer. Mid. Nat., vol. 39, p. 413, pl. 2, figs. 10, 13, 16, 1948.

Western subspecies (?) of *Ogcodes pallidipennis* Loew, Sabrosky (in part only, not figures), Amer. Mid. Nat., vol. 39, p. 418, 1948.

Ogcodes colei Sabrosky (Grass Valley, Calif., specimen only, not figures), Amer. Mid. Nat., vol. 39, p. 423, 1948.

Diagnosis: Species of group III with typical *Ogcodes* pattern (pl. 5, fig. 29), but tergal posterior white fasciae are quite narrow; characterized by having vein M_1 and crossveins r-m and m-cu distinctly present (pl. 3, fig. 7), coxae black (males) or partially yellow (females), otherwise legs yellow to brownish yellow; mesonotum and scutellum black, abdomen dark brown to black, the dark sternal fasciae broad and of even width; antennal style with one to four small apical setae; male genitalia with median plate of ejaculatory apodeme greatly expanded basally, forming two distinct cells (pl. 11, fig. 72, and pl. 12,

fig. 85); aedeagus with a subapical, fingerlike process (pl. 9, fig. 56).

TYPES: Holotype ♀, Montreal, Quebec, Canada, May 28, 1902, and paratype ♀, St. Johns County, Quebec (both in MCZ).

DISTRIBUTION: This species appears to be somewhat confined to the Canadian and Transition Zones of northern United States and southern Canada, and although ranging widely is not at all common (see text fig. 6).

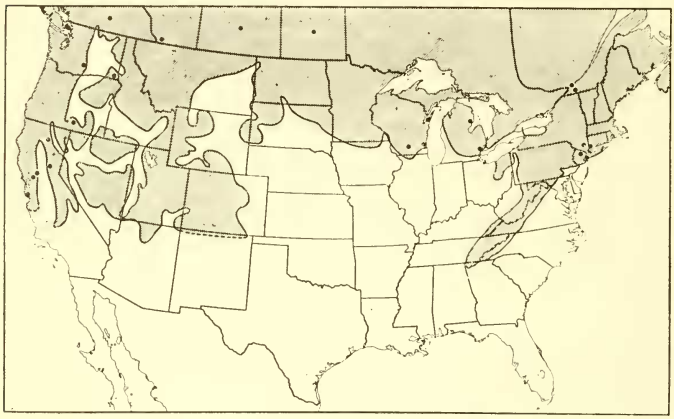

FIGURE 6.—Distribution of *Ogcodes borealis* Cole in the United States.

RECORDED DISTRIBUTION: Alberta (Waterton), Manitoba (Berens River), Maryland (Plummers Island), New York (McLean), and Saskatchewan (Waskesia), all Sabrosky (1948).

NEW DISTRIBUTION RECORDS: (27 specimens, 13 ♂, 14♀.)

ALBERTA: 1 ♀, Waterton Park, July 13, 1923 (E. H. Strickland, FRC).

BRITISH COLUMBIA: 1 ♀, Lorna, July 9, 1924 (G. Hopping, CNM), 1 ♀, London Hill Mine, Bear Lake, 7,000 ft., collected on snow (A. N. Caudell, USNM).

CALIFORNIA: 1 ♀, Putah Canyon, Yolo Co., April 21, 1949 (E. I. Schlinger, EIS); 1 ♀, same data, March 1934 (G. E. Bohart, GEB) [recorded by Sabrosky, 1948, as western subspecies of *O. pallidipennis* Loew]; 1 ♀, 12 mi. S. Grass Valley, Nevada Co., May 18, 1930 (E. P. VanDuzee, CAS) [recorded by Sabrosky, 1948, as possibly *colei* Sabrosky]; 1 ♀ (atypical), Hat Lake, Shasta Co., July 1948 (A. S. Perry, CIS); 1 ♂, 2 ♀, Santa Cruz Mts., Santa Cruz Co. (USNM) [det. as *melampus* by Coquillet, recorded as *melampus* by Cole, 1919, and as western subspecies of *pallidipennis* by Sabrosky, 1948, in part].

CONNECTICUT: 1 ♂, Redding, July 8, 1932 (A. L. Melander, ALM).

MANITOBA: 1 ♂, Machimac (?), July 3, 1910 (M. C. VanDuzee, CAS).

MAINE: 1 ♂, E. Harpswell, July 6, 1942, beaten from spruce or fir (AMNH).

MICHIGAN: 1 ♂, 1 ♀, Detroit, June 25 to July 1, 1944 (G. Steyskal, GS).

New York: 1 ♂, Cold Spring Harbor, June 25, 1930 (C. H. Curran, AMNH); 1 ♂, Bethpage, Long Island, Aug. 1938 (F. S. Blanton, CU).

New Jersey: 1 ♀, Ramsey, July 26, 1944 (W. J. Gertsch, AMNH), reared from *A. sattabunda* [recorded by Sabrosky, 1948, as *O. pallidipennis*].

Ontario: 1 ♂, Pancake Bay, Lake Superior, July 30, 1948 (W. J. Gertsch, AMNH).

Oregon: 1 ♂, Drews Gap, Klamath Co., July 6, 1950 (H. E. Cott, EIS).

Quebec: 1 ♂, Montreal Island, June 12, 1904 (ALM).

Washington: 1 ♂, Asotin, April 22, 1923 (A. L. Melander, ALM); 1 ♂, Zillah, June 23, 1923 (A. L. Melander, ALM); 1 ♀, Waldron Island, July 1, 1909 (W. Mann, USNM) [recorded by Sabrosky, 1948, as western subspecies of *pallidipennis*].

Wisconsin: 1 ♂, Dane Co., July 17, 1947 (D. C. Drake, EIS); 1 ♀, Door Co., July 7, 1950 (C. L. Fluke, UW); 1 ♀, Milwaukee Co., Aug. 11, 1902 (GEB).

Seasonal occurrence: From March (California) to Aug. 23 (Maryland), but more often encountered from May to July.

Recorded hosts: *Anyphaenella saltabunda* Hentz (recorded by Sabrosky, 1948, as host of *O. pallidipennis* Loew).

New host record: *Xysticus montanensis* Keyserling, immature, collected at Putah Canyon, Calif., Apr. 12, 1949. The parasite (♀) emerged from host Apr. 14, pupated Apr. 17, emerged as adult Apr. 21, and died Apr. 27, 1949.

Biology: Unknown except for rearing records cited above.

Discussion: Sabrosky (1944, 1948) first defined the male of the species and established its limits. On the basis of its wing venation and male genitalia, *borealis* forms a distinct segment of the subgenus shared only by the European species *pallipes*. But *borealis* is easily separable from the latter by its darker coloration and by the distinct fingerlike appendage of the aedeagus (compare pl. 8, fig. 51 and pl. 9, fig. 56).

Some confusion still exists as to the exact identity of this species since the type specimen was a female. Both Sabrosky (1948) and the author have a species concept which includes, among other features, the following wing venational characteristics: Vein M_1 strong, attached basally to stub of r-m crossvein; m-cu crossvein present and distinct; vein M_2 long; anal vein and vein Cu_2 join before wing margin (see pl. 3, fig. 7). However, according to a letter from P. J. Darlington, Jr. (1952), who compared an inked wing drawing (prepared by the author) with the female type of *borealis*, the following points were noted: Vein M_1 present, but faint; crossveins r-m and m-cu absent and vein M_2 short. This suggests a wing venation similar to that shown for *eugonatus* (pl. 4, fig. 18) except that vein M_1 is more complete in the type specimen. Two specimens (1 ♂, 1 ♀) out of some 35 examined appeared to be *borealis*, but each had a very weak vein M_1 and crossvein m–cu; hence, this species was keyed out twice in the key presented above.

For the present I conclude that the type female of *borealis* represents an atypical member of the population. However, there is the possibility that *borealis* of Cole is not the same as that of Sabrosky (1948) and this author, and a new species may be involved here.

***Ogcodes (Ogcodes) colei* Sabrosky**

PLATE FIGURES 21, 64, 98

Ogcodes colei Sabrosky, Amer. Mid. Nat., vol. 39, p. 423, pl. 1, fig. 7, pl. 2, fig. 18, 1948.

DIAGNOSIS: Species of group IV. Male abdomen patterned, without obvious tergal white fasciae; similar to both *vittisternum* Sabrosky and *shewelli* Sabrosky, but with abdomen mostly brown and not yellow; both tergites II, III have a large brown median spot which is flanked by yellow areas, tergites III, IV are nearly entirely brown; abdominal pile about twice as long as that on mesonotum; venter with lateral but no median row of brown spots; venation as in plate 4, figure 21; male genitalia with distal portion of aedeagus markedly acuminate (pl. 10, fig. 64) and with weakly developed ejaculatory apodeme (pl. 12, fig. 98).

TYPES: Holotype ♂, Huachuca Mts., Ariz. (USNM 58366). Paratype ♂, Tallac Lake, Tahoe, Calif., July 5, 1915 (E.P. VanDuzee, FRC). The locality spelling is probably "Tallac" and not "Tallao" as originally published.

NEW DISTRIBUTION RECORD: CALIFORNIA: 1 ♂, Mill Valley, Marin Co., Aug. 6, 1957 (H. B. Leech, CAS).

DISCUSSION: A third specimen mentioned by Sabrosky as probably this species from Clear Lake, Lake County, Calif., July 28, 1934 (E. C. Van Dyke, CAS), has been restudied and is *colei*. A fourth specimen recorded by Sabrosky as possibly being *colei* from Grass Valley, Calif., has been examined and found to be *borealis* Cole. A female specimen from the new locality above, and collected on Aug. 1, 1957, has been seen and may be this species, but if so, shows a degree of sexual dimorphism not heretofore noted in *Ogcodes* species. It is also possible that this female represents a species of the *pallidipennis* group, perhaps *adaptatus*. In any case, I note the following female characteristics which differ from the male of *colei* as compared with the male specimen above, with the idea of pointing out the possibility that sexual dimorphism exists here as has been shown for other genera of the Acroceridae (see Schlinger, 1956).

FEMALE: Head one-half as large as male; abdomen dark brown, not patterned, but with vary narrow posterior white fasciae

on tergites, much wider ones on sternites; abdomen with short pile about as in *adaptatus;* legs dark brown, only knees light brown; venation entirely unlike that of male (shown in pl. 4, fig. 21), being more like that shown for *gibbosus* (in pl. 3, fig. 13) except r-m crossvein much shorter, thus crossvein m-cu absent, vein M_1 faint, not joining R_{4+5} as in male, anal vein separated from vein Cu_2 towards wing margin, but veins M_2, M_4, Cu_2 and R_{4+5} as in male; squama heavily infuscated.

If this specimen represents the female sex of *colei*, which I believe to be the case, then one might speculate on the reason for the great venational differences occurring between the sexes. It might be that since the ovipositional habits of the known species (see biology section) show that females may spend the majority of their adult lives resting or walking on dead twigs depositing eggs, and since flight may be only instigated during mating, that a weaker or more simplified type wing venation evolved in the female sex; while the need for flight in the males, in order to better search out the resting females, has perhaps mandated the need for a primitive, and hence stronger type, wing venation. Although this does not appear to be the case in the closely related *vittisternum*, this condition might occur in *borealis*, in which case it might help to explain the wing venational differences observed there (see under *borealis* above).

Females of the other known Nearctic species of the *colei* group, i.e., *floridensis* and *shewelli*, are unknown, so that a comparison cannot be made with these species at this time. However, a similar situation may exist with *niger* (see below). Also, if dimorphism of this type should be proved, keys to the individual sexes would be a necessity.

Text figure 3 shows the relationships of *colei* to the Nearctic *Ogcodes* species, and there is little doubt that *vittisternum* is its closest relative.

Ogcodes (*Ogcodes*) *vittisternum* Sabrosky

Plate figures 63, 96

Ogcodes vittisternum Sabrosky, Amer. Mid. Nat., vol. 39, p. 420, pl. 1, figs. 2–3, 1948.

Diagnosis: Species of group iv. Male abdomen patterned, without obvious tergal white fasciae, similar to *colei* but tergite iii with distinct brown lateral spots; venter in both sexes with median and lateral brown spots on each sternite; venation as in *colei* (pl. 4, fig. 21); male genitalia similar to *colei* but the aedeagus is not as acuminate (pl. 10, fig. 63) and ejaculatory apodeme stronger, more like *shewelli* (pl. 12, fig. 96).

Type: Holotype ♂, Homestead Inn, Mount Hood, Oregon, July 6, 1927 (E. C. Van Dyke, FRC).

NEW DISTRIBUTION RECORD:

WASHINGTON: 1 ♂, 1 ♀, Spokane, Aug. 6, 1924 (A. L. Melander, ALM).

DISCUSSION: The male specimen from Washington has been compared with the holotype (♂) and is certainly conspecific. Although *vittisternum* is closely related to *colei* as stated above, it is undoubtedly closer to the New Zealand species, *leptisoma*, in spite of the great geographical separation (see discussion on the comparison of the New Zealand and the North American faunae above).

The female specimen from Washington does not differ structurally from the male, as was found to be the case in *colei* (see above). However, the female is not patterned as is the male but rather has the entire abdominal dorsum light brown, venter mostly dirty whitish brown, legs light brown, short abdominal pile, infuscated squama, and the head about one-half as large as the male. Most of the female characters agree with those found above for the female of *colei*, except that *vittisternum* shows no venational differences between the sexes.

From the phylogenetic standpoint, *vittisternum* is an interesting species since it seems likely that it gave rise to *albiventris* (Johnson), which now forms the new subgenus *Neogcodes* (see text fig. 3).

***Ogcodes (Ogcodes) floridensis* Sabrosky**

Ogcodes floridensis Sabrosky, Amer. Mid. Nat., vol. 39, p. 421, pl. 1, fig. 4, pl. 2, fig. 19, 1948.

DIAGNOSIS: Species of group IV. Male abdomen patterned, without tergal white fasciae; tergite II entirely yellow, III, IV with three brown spots, the median one triangular; venter apparently mostly yellow with faint lateral brown spots as in *vittisternum*, but no median row of spots; halter black with yellow stalk; venation about as in figure 21; male genitalia similar to *vittisternum*, but the aedeagus more acuminate apically and somewhat broader subapically than in plate 10, figure 63 (see Sabrosky, 1948, pl. 2, fig. 19).

TYPE: Holotype ♂, Brevard County, Florida, Sept. 22, 1929 (Julian Howard, USNM 58365).

DISCUSSION: Although this species is superficially related to *vittisternum*, it is apparently closer to *shewelli*, and thus to the New Zealand species *nitens*. I have not examined the holotype of *floridensis*, but by studying its original description in connection with specimens of *nitens*, *shewelli*, and *vittisternum* there seems to be little doubt of this association.

Although *floridensis* is at present known only from the holotype male, this is not surprising since *Ogcodes* specimens in general are very uncommon throughout the Austroriparian region. In fact, I know of only two other records from Florida.

***Ogcodes (Ogcodes) shewelli* Sabrosky**

PLATE FIGURES 62, 97

Ogcodes shewelli Sabrosky, Amer. Mid. Nat., vol. 39, p. 422, pl. 1, fig. 6, pl. 2, fig. 20, 1948.

DIAGNOSIS: Species of group IV. Male abdomen patterned, without tergal white fasciae; tergites II-IV yellow with only small brown median triangular spots; venter entirely pale yellow except for faint infuscation on sternite 1; venation about as in plate 4, figure 21; male genitalia yellow; aedeagus as in plate 10, figure 62, ejaculatory apodeme small as in plate 12, figure 97.

TYPE: Holotype ♂, Niagara Glen, Ontario, Canada, July 27, 1925 (G. S. Walley, CNM).

NEW DISTRIBUTION RECORD:

NEW YORK: 1 ♂, Cold Spring Harbor, July 27, 1927 (A. L. Melander, ALM).

DISCUSSION: This colorful species has close affinities with both *floridensis* and *nitens*, and actually appears to be closer to the latter species in most respects, even though *floridensis* and *shewelli* occur in North America while *nitens* is restricted to New Zealand.

Because this species is so little known, it seems worth while noting that both of the known specimens were collected on the same day, even though two years apart and at separate localities. It may be that the adults of this species have a very short spatial existence, a fact which could account for its rareness in collections. The more plausible reason, however, seems to be that *shewelli* (as well as all known members of the *colei* group in North America) has difficulty in competing with such widespread and adaptive species as *adaptatus*, *eugonatus*, and *pallidipennis*.

***Ogcodes (Ogcodes) niger* Cole**

Ogcodes niger Cole, Trans. Amer. Ent. Soc., vol. 45, pp. 65–66, pl. 15, fig. 41, 1919; Psyche, vol. 30, p. 48, 1923.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 389, 1944; Amer. Mid. Nat., vol. 39, p. 427, 1948.

DIAGNOSIS: Species of group IV (?). Female body shining black, antenna whitish; femora darkened, knees, tibiae and tarsi whitish; vein M_1 present but apparently faint, r-m crossvein absent, m-cu crossvein present (extracted from Cole, 1919).

TYPE: Holotype ♀, Stockton, Utah, July 11, 1916 (T. Spaulding, MCZ).

DISCUSSION: I have not seen this species, and apparently there are no specimens known except the holotype female. Sabrosky (1948, p. 427) examined the type and concluded that the species was unrecognizable to him. I have tentatively placed it in the *colei* group on the basis of vein M_1 being present, r-m crossvein being absent, and

m-cu crossvein being present. As far as its distribution and color characters are concerned, however, it could represent an atypical specimen of several species, such as *borealis*, *adaptatus*, or *eugonatus*. Nevertheless, Cole's figure of *niger* plainly shows crossvein m-cu present, a character not found in other species of either the *eugonatus* or *pallidipennis* groups. The presence of crossvein m-cu together with the fact that females are unknown for most species of the *colei* group suggest that *niger* probably belongs in this latter group. That females of the strikingly patterned males of the *colei* group should be of the simple fasciated type has now been partially verified by an examination of females of both *colei* and *vittisternum*, as well as (*Neogcodes*) *albiventris*.

A possibility that the wing venation of *niger* females may be different from *niger* males was discussed under *colei* (see above).

***Ogcodes (Ogcodes) pallidipennis* Loew**

PLATE FIGURES 36, 102

Oncodes pallidipennis Loew, Berliner Ent. Zeit., vol. 9, p. 149, 1865.

Oncodes costatus Loew, Berliner Ent. Zeit., vol. 13, p. 165, 1869.—Melander, Ent. News, vol. 13, p. 178, 1902.—Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 11, p. 341, pl. 81, fig. 23, 1915; Bull. Illinois State Nat. Hist., vol. 12, p. 368, pl. 53, fig. 1, 1917.—Gillette, State Ent. Colorado Cir., vol. 43, p. 49, figs. 8–9, 1924.

Oncodes incultus Osten Sacken, Bull. U.S. Geog. and Geol. Surv., p. 279, 1877.

Oncodes humeralis Osten Sacken, (type ♂, MCZ, northern Sonora, Mexico), Biol. Ent. Amer. Dipt., vol. 1, p. 164, 1887. New synonymy.

Oncodes aedon Townsend, (type ♂ (?) destroyed; Baja Purisima, Baja California, Mexico), Proc. California Acad. Sci., ser. 2, vol. 4, p. 607, 1895. New synonymy.

Ogcodes melampus, Cole, in part, Trans. Amer. Ent. Soc., vol. 45, p. 62, 1919 (not Loew, 1872).

Ogcodes incultus, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 62, 1919.—Cole, et al., Proc. Ent. Soc. Washington, vol. 26, p. 182, 1924.

Ogcodes pallidipennis, Cole, in part, Trans. Amer. Ent. Soc., vol. 45, p. 63, 1919; Psyche, vol. 30, p. 48, 1923.—Cole, et al., Proc. Ent. Soc. Washington, vol. 26, p. 182, 1924.—Sabrosky, in part, Amer. Mid. Nat., vol. 31, p. 392, 1944; Amer. Mid. Nat., vol. 39, p. 415, 1948 (not figures).

Ogcodes costatus, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 64, pl. 14, fig. 40, 1919.—Cole, et al., Proc. Ent. Soc. Washington, vol. 26, p. 182, 1924.—Cole, Proc. California Acad. Sci., vol. 16, p. 422, figs. 80 and 82, 1927.—Kaston, Journ. New York Ent. Soc., vol. 45, p. 416, figs. 1–5, 1937.

Ogcodes humeralis, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 64, 1919.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 389, 1944; Amer. Mid. Nat., vol. 39, p. 427, 1948.

Ogcodes aedon, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 65, 1919.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 389, 1944; Amer. Mid. Nat., vol. 39, p. 427, 1948.

DIAGNOSIS: Species of group v, with white tergal fasciae as in plate 5, figure 29, characterized by its reddish brown appearance (rarely all blackish brown), black mesonotum, brown scutellum,

light brown, yellow, or white postalar callus and humerus; venation as in plate 3, figure 11; male genitalia large; aedeagus as in plate 7, figure 36; ejaculatory apodeme as in plate 13, figure 102.

Type: Holotype ♀, Pennsylvania (Osten Sacken, MCZ).

Distribution: This is one of the most commonly encountered and widely distributed species of Nearctic *Ogcodes*. It spreads throughout the middle and northeastern United States and southern Canada, becomes less frequent in the west where it is known only in southern California, and ranges south through Mexico to Costa Rica (see text fig. 7).

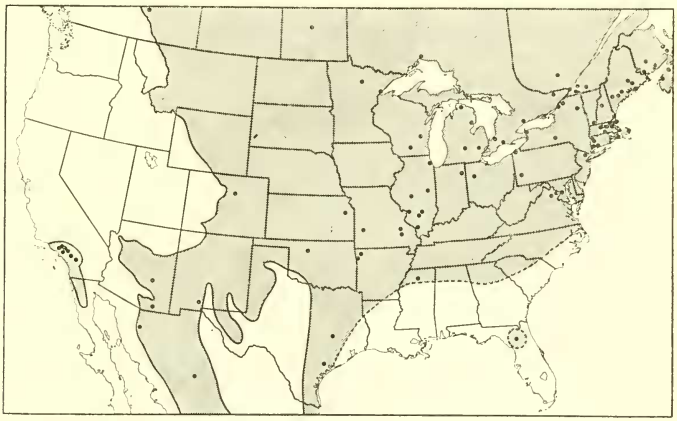

Figure 7.—Distribution of *Ogcodes pallidipennis* Loew in the United States.

Recorded distribution: The following state records represent only those specimens which have been reexamined or those which were cited by Sabrosky (1944, 1948) and about which there seems little doubt: Arkansas, Baja California (*aedon* Townsend), Connecticut, District of Columbia, Illinois, Indiana, Kansas, Maine, Manitoba, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Brunswick, New Hampshire, New Jersey, New York, Ohio, Ontario, Pennsylvania, Sonora (*humeralis* Osten Sacken), Texas, Vermont, Virginia, and Wisconsin.

New distribution records: (170 specimens, 95♂, 75♀).

Alberta: 1 ♀, Sundre, July 12, 1946, on poplar tree (CNM).

Arizona: 1 ♀, Globe, July 18, 1935 (F. Parker, EIS); 1 ♀, Carr Canyon, Huachuca Mts., Cochise Co., Aug. 1905 (H. Skinner, PANS).

Arkansas: 2 ♀, Fayetteville, May 30 to June 10, 1933 (H. H. Schwardt, CU).

California: 2 ♂, 1 ♀, Fish Canyon, San Gabriel Mts., Los Angeles Co., reared, various dates (E. I. Schlinger, EIS); 3 ♂, Glendale, Los Angeles Co., Aug. 4, 1950, in window sill, July 27, 1952, and June 30, 1950, dead in spider web (W. M. and E. I. Schlinger, EIS); 1 ♀, Redlands, April 30, 1924 (FRC); 1 ♀, Idyllwild, San Jacinto Mts., June 17, 1940 (E. G. Linsley, CIS); 1 ♂, 1♀, Riverside, Sept. 4, 1926, (♂), June 8, 1950 (♀) (P. H. Timberlake, UCR); 1 ♀, Whittier, Los Angeles Co., Sept. 30, 1930, "on avocado" (Bartholomew, LAM); 1 ♂, Tanbark Flat, Los Angeles Co. (D. D. Sprague, UCD); 1 ♀, Pasadena, Los Angeles Co. (J. M. Aldrich, USNM).

Colorado: 1 ♀, Cascade, Aug. 20, 1903 (AMNH).

Connecticut: 1 ♀, Litchfield, June 12, 1936 (R. B. Friend, CAES): 1 ♂, Culibrook (Colebrook?), June 24, 1914 (C. G. Hewitt, CNM).

Costa Rica: 3 ♀, La Suiza, Jan. 7 to Feb. 20, 1924 (P. Schild, ALM, EIS).

District of Columbia: 1 ♂, Aug. 18, 1886 (USNM).

Florida: 1 ♀, W. of Gainesville, April 18, 1938 (W. J. Gertsch, AMNH).

Illinois: 1 ♀, Algonquin (C. W. Johnson Collection, ALM); 1 ♂, Oxville, Scott Co., Aug. 22, 1948 (W. Nutting, WSC).

Iowa: 1 ♀, Des Moines, June 14, 1953 (J. Parks, JP).

Kansas: 1 ♂, Douglas Co., elev. 900 ft. (UK); 1 ♂, Lawrence, June 9, 1922 (C. H. Curran, CNM).

Maine: 3 ♀, Murphy Lake, Bar Harbor, July 5, 1928 (MSC); 1 ♀, Monmouth, July 14, 1916 (M. C. VanDuzee, CAS); 1 ♀, Mt. Desert Island, July 10, 1929 (AMNH); 4 ♂, 4 ♀, Augusta, June 12 to July 27, 1939 to 1944 (A. E. Brower, AMNH); 1 ♂, Bar Harbor, Mt. Desert Island, No. 6241, July 8, 1938 (A. E. Brower, AMNH); 7 ♂, 5 ♀, S. Bristol, July 27, 1935 (AMNH); 1 ♂, Kokadjo, July 15, 1941, beaten from spruce (AMNH).

Manitoba: 2 ♀, Aweme, July 25, 1916, and July 3, 1923 (N. Criddle and H. A. Robertson, CNM).

Massachusetts: 3 ♂, 1 ♀, Petersham, June 1932 (C. T. Brues, ALM, EIS); 2 ♂, Eastham, July 11, 1944 (C. P. Alexander, MSC); 1 ♀, Berlin, July 2, 1917 (MSC); 1 ♂, Phillipston, June 12, 1922 (H. H. Shepard, MSC); 1 ♀, Hemps Co., June 1922 (P. A. Readio, CNM); 1 ♂ "Mass." (W. M. Wheeler, AMNH).

Mexico: 1 ♂, Guadalajara, Jalisco, 1909 (McConnell, CM); 1 ♀, Sierra Madre, head of Río Piedras Verdes, Chihuahua, alt. 7,300 ft., July 15 (Townsend, USNM) [recorded by Sabrosky, 1948, as west. subsp. of *pallidipennis*].

Michigan: 1 ♂, Iosco Co., June 20, 1940 (R. R. Dreisbach, RRD).

Minnesota: 1 ♀, Itasca Park, July 2, 1941 (C. E. Mickel, UM); 1 ♂, Sucker River, Lake Superior, St. Louis Co., July 4, 1938 (D. G. Denning, UM).

Missouri: 1 ♂, Arcadia, May 31, 1943 (R. C. Froeschner, RCF); 1 ♂, Des Arc, May 31, 1943 (R. C. Froeschner, RCF).

New Brunswick: 1 ♂, Fredericton, July 2, 1930 (R. P. Gorham, CNM); 1 ♂, Shediac, July 2, 1939 (W. J. Brown, EIS); 1 ♂, St. Andrews, June 28, 1938 (T. N. Freeman, EIS); 1 ♀, Harcourt, July 10, 1918 (M.B.D., CNM).

New Hampshire: 3 ♂, 3 ♀, Franconia (Mrs. A. T. Slosson, AMNH)

New Mexico: 1 ♀, Mesilla Dam, April 24, 1934 (GEB) and 1 ♀, Rociada, Aug. 8 (Cockerell, USNM) [both recorded by Sabrosky, 1948, as western subspecies of *pallidipennis*].

New York: 1 ♂, Ithaca, July 26, 1916 (H. K. Knight, UM); 1 ♂, Ithaca, July 11, 1941 (J. N. Belkin, UCLA); 1 ♂, 1 ♀, in copula, Ithaca, June 25 (CU), 1 ♂, Niagara Falls, Aug. 17, 1907 (M. C. VanDuzee, CAS); 1 ♀, Wells, July 27, 1914 (D. B. Young, NYSM); 1 ♂, Morristown, July 8 to July 14 (CM); 1 ♀, Grand Island, June 26, 1910 (M. C. VanDuzee, CAS); 1 ♀, Keene, June 24, 1920 (W. Wild, CAS).

Northwest Territory: 1 ♀, Reliance, June 1937 (W. J. G. Stewart, EIS).

Nova Scotia: 1 ♂, Smith's Cove, June 23, 1916 (CNM); 1 ♂, Truro, June 26, 1915 (CNM); 1 ♂, 1 ♀, Baddeck, July 10, 1936 and July 31, 1941 (T. N. Freeman, CNM); 1 ♂, Kings Co., June 25, 1931 (C. E. Atwood, CNM); 1 ♀, Mt. Denson, June 16, 1936 (CNM).

Ohio: 1 ♀, Allen Co., Aug. 7, 1949 (C. A. and W. E. Triplehorn, EIS).

Oklahoma: 1 ♂, Cleo Springs, June 5, 1937 (Standish-Kaiser, OAM).

Ontario: 7 ♂, Toronto, 1896 (Hough, CNM, ALM); 3 ♂, Thunder Bay Beach, June 26 to July 22, 1941 and July 1, 1942 (H.S. Parish, CNM); 1 ♀ (teneral), Rocklitte, July 24, 1928 (J. A. Adams, CNM); 2 ♀, Camlachie (W. Mickels, CNM); 1 ♀, Queenstown, July 15, 1934 (D. F. Patterson, CNM); 1 ♂, Grand Bend, July 8, 1939 (G. E. Shewell, CNM); 1 ♂, Ottawa, June 24, 1915 (C. B. Hutchings, CNM) [det. by Curran as a metatype of *O. melampus* Loew].

Pennsylvania: 1 ♂, 4 ♀, Morton, June 5, 1913 (PANS); 1 ♂, 1 ♀, Pittsburgh, June 19, 1911 and June 25, 1908 (H. Kahl, CM); 1 ♂, Erie, July 9, 1926 (H. Kahl, CM).

Quebec: 2 ♀ (teneral), Knowlton, July 22 and Aug. 7, 1929 (L. J. Milne, CNM); 1 ♂, 1 ♀, Clarenceville, July 15, 1933 (G. H. Hammond, CNM); 1 ♀, Rigaud, June 1906 (CNM); 5 ♂, 4 ♀, Abbotsford, June 1935, June 25, 1936, and June 22, 1937 (G. E. Shewell, CNM, EIS); 1 ♀, Georgeville, June 23, 1936 (G. S. Walley, EIS); 1 ♀, Aylmer, July 2, 1935 (G. S. Walley, CNM); 1 ♂, Nominique, June 13, 1941 (O. Peck, CNM).

Vermont: 1 ♀, Laurel Lake, Jacksonville, July 3, 1935 (H. Pratt, UM).

Virginia: 1 ♀, Warrenton, May 30, 1928 (L. C. Woodruff, UK); 7 ♂, Falls Church, Aug. 26 to 31, and Sept. 5 to 20, 1912 to 1916 (C. T. Green, USNM).

West Virginia: 1 ♂, Fairmont, July 1942 (R. B. Bennett, ALM).

Wisconsin: 9 ♂, Milwaukee (MPM); 2 ♂, "Wis." (W. M. Wheeler, AMNH); 1 ♂, Fond du Lac Co. (UW); 1 ♀, Madison, July 14, 1935 (H. R. Dodge, EIS).

Seasonal occurrence: Males appear from May 31 (Des Arc, Mo.) to Sept. 4 (Riverside, Calif.), females from Apr. 18 (Gainesville, Fla.) to Sept. 30 (Whittier, Calif.). Specimens collected in Riverside, Calif., as early as June 8 (♀) and as late as September 4 (♂) indicate that *pallidipennis* may have, at least in that area, a rather continuous generation, or at least a longer flight period than is known for most species of *Ogcodes*.

Recorded hosts: *Pardosa saxatilis* (Hentz) and a *Lycosa* species were recorded by Kaston (1937) from Connecticut (see also table 1).

New host records: Ten specimens were reared by the author from the following spiders collected in Los Angeles County, Calif., during the years 1943–1950:

Steatoda palomara Chamberlin and Ivie, immature, collected at Glendale. Parasite (♀) emerged as an adult Sept. 7, 1943.

Walmus species, immature, collected at Fish Canyon, San Gabriel Mts. Parasite (♂) emerged from host June 11, 1944, pupated June 13, emerged as adult June 21, and died July 3, 1944.

Xysticus montanensis Keyserling, immature, collected at Glendale. Parasite (♀) emerged from host Aug. 11, 1946, pupated Aug. 13, emerged as adult Aug. 24, and died Sept. 1, 1946.

Hololena curta McCook, mature ♀, collected at Glendale. Parasite (♀) emerged from host May 17, 1949, pupated May 19, emerged as adult May 24, and died June 2, 1949.

Hololena curta McCook (?), immature, collected at Glendale. Parasite (♀) emerged from host May 25, 1949, pupated May 26, emerged as adult June 2, and died June 6, 1949.

Hololena curta McCook (?), immature, collected at Glendale, Parasite (♀) emerged from host July 31, 1949, pupated Aug. 1, emerged as adult Aug. 6, and died Aug. 11, 1949.

Hololena curta McCook (?), immature, collected at Glendale. Parasite (♀?), pupated Jan. 21, 1950, started to emerge on January 27 but did not completely emerge from the pupal skin. Even though it was not fully emerged, the fly lived until Feb. 1, 1950, or five days.

Hololena curta McCook (?), immature, collected at Fish Canyon, San Gabriel Mts. Parasite (♀) pupated Mar. 31, 1950, emerged as adult Apr. 6, and died Apr. 12, 1950.

Hololena curta McCook (?), immature, collected at Glendale. Parasite (♂) emerged from host Apr. 4, 1950, pupated Apr. 7, emerged as adult Apr. 12, and died Apr. 17, 1950.

Herphyllus species, immature, collected at Glendale. Parasite (♂) first seen as prepupa Apr. 8, 1950, pupated Apr. 10, emerged as adult Apr. 14, and died Apr. 18, 1940

Biology: Schlinger (1952) reported *Hololena curta* McCook as a rather common host of the acrocerid *Opsebius diligens* Osten Sacken. The records cited above for *pallidipennis* and unpublished records of *Acrocera melanderi* Cole attacking the same host indicate considerable competition for this host. All specimens of the host *Hololena curta* collected at Glendale, Calif., were taken from the same hillside within a 100 ft. sq. area, which would indicate that considerable competition existed for this specific host between the parasites of at least three genera of acrocerids.

From the available biological information, it appears that *pallidipennis* agrees in most respects with other *Ogcodes* species. Malloch (1915, 1917) recorded and figured the pupal skin from Illinois. Gillette (1924) reported a peculiar case of egg-laying in which the parasite flew into a house in Colorado and deposited nearly 3,000 eggs in about one hour on a small piece of cloth. Kaston (1937) has discussed and figured the posthost developmental stages in Connecticut.

As indicated from the new rearing data cited above, the average periods of time involved in the various developmental stages were as follows: Emergence from host to pupation was 1.8 (1–3) days; pupal period was 6.5 (4–11) days; adult longevity under poor laboratory conditions was 6.5 (4–12) days. In nature, adults of *pallidipennis* would no doubt live much longer, perhaps 20–30 days.

Discussion: The accumulation of specimens from southwestern United States, Mexico, and Costa Rica has increased the known dis-

tribution of *pallidipennis* greatly, and has allowed me to question the validity of *aedon* Townsend and *humeralis* Osten Sacken.

Specimens from Mexico, southern California, New Mexico, and Texas were compared with the original descriptions of *aedon* and *humeralis*. No specific differences could be detected, and an examination of the male genitalia of the Guadalajara specimen revealed it was typical *pallidipennis*. The female from Chihuahua was a little darker than that described for *humeralis*, but the type of the latter was stated to be a male, and the males of *pallidipennis* are usually lighter than the females.

The type of *aedon* was destroyed in the California Academy of Sciences Museum in the San Francisco fire of 1906. Townsend (1895) said in his original description: "Very similar to *Oncodes humeralis* O.S., but differs in the tegulae being fuscous whitish with well defined narrow dark brown margins." This latter character appears to be the only one which might differentiate *aedon* from *humeralis* and *pallidipennis*. However, it has been found that the degree of infuscation of the squama in species of the *pallidipennis* group is somewhat variable, and is therefore a doubtful specific character (see discussion under *adaptatus*). Since the other specific characters mentioned in the descriptions of *aedon* and *humeralis* agree well with *pallidipennis*, and since the range of the latter is now known to extend well beyond the limits of the type localities of the two species involved, it seems reasonable to suspect this synonymy.

Many earlier authors have confused *pallidipennis* with such species as *eugonatus* and *melampus* and with specimens now known to be *adaptatus*, new species. Sabrosky (1944, p. 392) was the first to recognize that synonymy was involved and noted that *costatus* was the light-colored male and *incultus* the dark-colored female of *pallidipennis*. The specimens cited above from Costa Rica are of this dark "*incultus*" form.

Light-colored specimens of *borealis* and dark-colored specimens of *dispar* also might be confused with *pallidipennis* females. However, the characters given in the key to the species should be sufficient to separate them.

I believe that *pallidipennis* is the most primitive member of group v in North America and presume that it gave rise to the closely related *dispar* (see text fig. 3). The European species *varius* is quite closely related to both of the former species as well as to the Nearctic *rufoabdominalis*. The male genitalia will separate all the above species as well as *adaptatus*. The last, although not closely related, has been associated with *pallidipennis* by Sabrosky (1948) and Kessel (1948).

The largest specimen I have seen was a female from Costa Rica whose length was 9 mm. and whose wing length was 10 mm. The smallest specimen seen was a female from Petersham, Mass., which measured only 2.5 mm. in length.

Ogcodes (*Ogcodes*) *dispar* (Macquart)

PLATE FIGURES 33, 35

Henops dispar Macquart, Dipt. Exot., Supp., vol. 5, p. 67, pl. 2, fig. 12, 1855.
Ogcodes dispar, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 66, pl. 14, fig. 39, 1919.—Cole, et al., Proc. Ent. Soc. Washington, vol. 26, p. 182, 1924.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 390, 1944; Amer. Mid. Nat., vol. 39, p. 412, 1948.—Farr, Bull. Brooklyn Ent. Soc., vol. 48, p. 39, 1953.
Oncodes dispar, Champlain and Knull, Ent. News, vol. 34, p. 211, 1923.
Oncodes vittatus Johnson, Psyche, vol. 30, p. 50, 1923.
Ogcodes vittatus, Sabrosky, Amer. Mid. Nat., vol. 31, p. 391, 1944.

DIAGNOSIS: Species of group v with typical posterior tergal fasciae (fig. 29), but usually more yellow or brownish yellow than in most species; spiracular area much darker than surrounding ground color; thorax yellow or dark orange in ground color, with or without one to three dark vittae; venation as in plate 3, figure 11; aedeagus as in plate 7, figure 35; ejaculatory apodeme (pl. 6, fig. 33) about as in plate 13, figure 102 for *pallidipennis*.

TYPE: ♂ and ♀, on the same pin, Baltimore, Md. (Muséum National d'Histoire Naturelle, Paris).

DISTRIBUTION: This is a widespread but rather uncommon species which ranges throughout eastern North America, north to Quebec

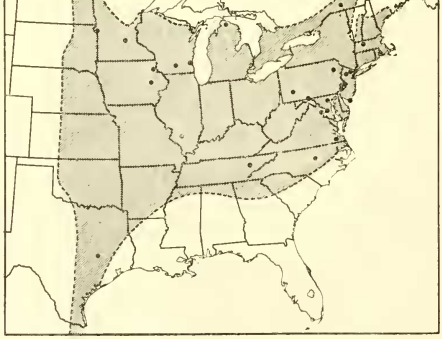

FIGURE 8.—Distribution of *Ogcodes dispar* (Macquart) in the United States.

and south through Texas to Costa Rica. There are, however, no Mexican records, and the available ones from the Austroriparian Zone of southeastern United States are few (see text fig. 8).

Recorded distribution: Arizona (doubtful record), District of Columbia, Illinois, Iowa, Maryland, Massachusetts, North Carolina, Pennsylvania, Quebec, Texas, and Virginia.

New distribution records: (25 specimens, 14♂, 11♀.)

Costa Rica: 1♂, La Suiza, June 16, 1924 (P. Schild, EIS).

Iowa: 1♂, McGregor, July 1, 1950 (Hicks, Slater, ISC).

Michigan: 1♂, Cheboygan Co., July 18, 1949 (A. C. Reneau, ISC).

Minnesota: 1♀, Lake Minnetonka, Enchanted Isle, June 26, 1932 (E. R. Tinkham, UM); 1♀, Big Stone Co. (O. W. Oestlund, UM).

New Jersey: 1♂, Cape May, Aug. 13, 1896 (W. Stone, PANS); 1♀, Boonton, June 16, 1901 (G. M. Green, USNM); 1♂, 1♀, Ramsey, June 29, 1941 (♂), July 13, 1941 (♀), (W. J. Gertsch, AMNH, EIS).

New York: 1♀, New Rochelle, June 1, 1932 (L. Lacey, AMNH).

Pennsylvania: 1♂, Pittsburgh (ALM); 1♀, Swarthmore, Aug. 19, 1906 (E. T. Cresson, Jr., PANS); 1♂, Westmoreland Co. (CM); 1♂, Jeannette, June 21 (CM).

Quebec: 1♀, Montreal, July 7, 1912 (E. P. VanDuzee, CAS).

Tennessee: 1♀, Knoxville, Sept. 10, 1948 (D. W. Pfitzer, UT).

Virginia: 1♂, Falls Church, Aug. 27, 1916 (C. T. Greene, USNM).

Wisconsin: 1♀, Madison, June 22, 1929 (M. H. Doner, UW); 4♂, 2♀, Milwaukee (MPM).

Seasonal occurrence: Males have been taken from March 28 (College Station, Tex.) to August 27 (Falls Church, Va.), and females from May 8 (Great Falls, Va.) to November 10 (Knoxville, Tenn.).

Recorded hosts: None.

Biology: Little has been known until recently. Champlain and Knull (1923) reported locating in Pennsylvania a wasp nest in a log which, when opened, contained several nicely preserved specimens of *dispar*. Along with these were remains of spiders which presumably were their hosts that had been stored by a spider wasp. Farr (1953) observed this species in Massachusetts in what was apparently a mating swarm. The flies were observed about 12 feet above the ground, and were flying in zig-zag fashion. Occasionally one would depart from the swarm and land on a twig or leaf of a certain white ash (*Fraxinus americana* L.), which stood about 5 feet high. I have examined several examples of the series collected by Farr and they were typical *dispar*.

Discussion: In its lighter coloration and darkened spiracular area, this species resembles *rufoabdominalis*. However, it is phylogenetically much closer to *pallidipennis*, the females being quite difficult at times to distinguish. *O. dispar* appears to be sympatric with *pallidipennis* throughout most of the latter's range, with many specimens having the same locality and date. When the mesonotal vittae are

present the species is easily distinguished from all of its relatives; otherwise, the combination of characters given in the key will be necessary to accurately define it. It also seems possible that the Mexican *dusmeti* Arias may turn out to be *dispar* (see discussion under *rufoabdominalis*).

Ogcodes (*Ogcodes*) *rufoabdominalis* Cole

PLATE FIGURE 34

Ogcodes rufoabdominalis Cole, Trans. Amer. Ent. Soc., vol. 45, p. 68, pl. 15, fig. 43, 1919; Psyche, vol. 30, p. 48, 1923.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 389, 1944; Amer. Mid. Nat., vol. 39, p. 419, 1948.

DIAGNOSIS: Species of group v. Both sexes have a yellowish orange to brownish orange abdomen with a narrow or broad median row of black, subtriangular spots and a row of small, dark brown, spiracular spots; the thorax is entirely black, the legs are brown with black infuscations; venation as in plate 3, figure 11; aedeagus as in plate 7, figure 34; ejaculatory apodeme as in plate 13, figure 102.

TYPES: Holotype ♂, Great Salt Lake, Utah, June 8, 1915 (M. C. VanDuzee, CAS). "Neotype ♀," mouth of Bear River, Utah July 11, 1915 (A. W. Wetmore, in the U.S. Biological Survey Collection) [designated by Cole, 1923, p. 48].

DISTRIBUTION: This is a fairly common species which is apparently restricted to the Great Salt Lake Basin or Lake Bonneville area of Utah. The published records from Utah besides the type localities are Goshen, Spanish Fork, Saltair, and Locomotive Springs. The California specimen cited by Sabrosky (1948, p. 420) as *rufoabdominalis* has been examined and found to be a teneral female of *adaptatus*, new species.

NEW DISTRIBUTION RECORDS: (87 specimens, 18♂, 69♀.)

UTAH: 4♂ 68♀, Gun Club Lakes, Salt Lake City, Aug. 22, 1955 (L. T. Nielsen, G. C. Collett, UU, EIS), some collected on *Scirpus* species; 1♂, Salt Flats (N. Fisher, UU); 3♂, West Salt Lake (Telford, UU); 1♂, Salt Lake City, July 31, 1948 (Knowlton and Houck, USAC); 1♀, Hot Springs, June 4, 1934 (Knowlton and Rowe, AMNH); 1♂, Ogden, June 15, 1942 (S. L. Wood); 1♂, June 20, 1937 (D. E. Hardy); 1♂, Provo, June 15, 1948 (G. F. Knowlton); 2♂, Payson, Aug. 13, 1943 (Knowlton and Maddoch); 1♂, Aug. 1 (Knowlton and Stains); 2♂, Brigham, June 10, 1938 (Knowlton et al.); 1♂, Far West, Aug. 10, 1938 (Knowlton and C. F. Smith) [all in USNM or USAC].

SEASONAL OCCURRENCE: Males and females have been collected from May 21 (Saltair) to August 22 (Salt Lake City). Since both sexes have been taken together from May 21 to August 22, it would seem that a much longer flight period might be expected, possibly April to September.

RECORDED HOSTS: None.

BIOLOGY: Unknown.

Discussion: The question of the relationship of *rufoabdominalis* to *dusmeti* Arias from Mexico was discussed by Sabrosky (1948, p. 419) and resulted in the questionable synonymy of the latter species. A thorough study of the original description of *dusmeti* does not reveal any significant differences between the two. However, since there are no available intervening records (Mexico to Utah), I feel it best to retain *dusmeti* as a distinct species with the hope that the type or topotypical material can be studied in the future to clarify its status.

Both Cole (1919) and Sabrosky (1948) noted the similarity of *rufoabdominalis* to *varius* Latreille from Europe. An examination of a small series of the latter species from Germany and Hungary (4 ♂, 2♀) showed the following distinctive features:

O. rufoabdominalis: Male genitalia with aedeagus more rounded apically (compare pl. 7, fig. 34 and pl. 8, fig. 47); humerus, postalar callus, and scutellum black; femora not usually heavily infuscated; spiracular area very dark in comparison to surrounding tergal area.

O. varius: Male genitalia with aedeagus rather pointed apically (pl. 8, fig. 47); humerus, postalar callus, and scutellum usually brown, not all black, if any; femora heavily infuscated; spiracular area hardly differentiated in color from tergum.

The females of *varius* are more similar to *pallidipennis* than to *rufoabdominalis*. Unquestionably, all three are rather closely related, a fact which points to a possible Holarctic connection in the recent past.

***Ogcodes* (*Ogcodes*) *dusmeti* Arias**

Ogcodes dusmeti Arias, Bol. Soc. España Hist. Nat., vol. 20, p. 191, figs. 1, 2, 1920.

Types: ♂ and ♀, Mexico (Conradt, 1903). Although the types are said to be in the Museo Nacional de Ciencias Naturales, Madrid, I had direct correspondence with the Museum authorities and was unable to verify their presence.

Discussion: Species of group v, judging from the description and figure of wing venation. The status of this species was given by Sabrosky (1948) under *rufoabdominalis*, and is further discussed above under the latter. The type locality "Mexico" gives little help in understanding *dusmeti*, for we actually do not know whether it is a Nearctic or Neotropical representative. A study of the type material will be necessary to ascertain the correct placement of this species.

***Ogcodes* (*Ogcodes*) *adaptatus*, new species**

Plate figures 1–5, 11, 24, 25, 29, 32, 41

Ogcodes melampus, Sabrosky, Amer. Mid. Nat., vol. 31, pp. 391–392, 1944 (not Loew, 1872).

Ogcodes pallidipennis (western subspecies ?), Sabrosky, in part, Amer. Mid. Nat., vol. 39, pp. 416–418, pl. 2, figs. 11, 14, 17, 1948 (not Loew, 1865).

Ogcodes pallidipennis, Kessel, Wasmann collector, vol. 7, pp. 115–116, 1948 (not Loew, 1865).

Species of group v.

MALE: Length of entire specimen 4.75 mm., wing length 4.75 mm.

Head entirely black except grayish black frons and dark brown antenna; antenna with one small apical seta on segment III (pl. 5, fig. 25).

Thorax black, covered with short, appressed, grayish white pile (pl. 1, fig. 3), somewhat longer and less appressed on upper pleura; legs with coxae, femora, tarsi black, tibiae black except for dark brown on basal three-fourths of inner surface and basal one-fifth of outer surface; wing hyaline, vein M_1 present throughout its length, but not extremely strong, longer than R_{4+5}, cross-vein m-cu completely absent, r-m crossvein present and distinct, vein M_2 short and pale (pl. 3, fig. 11); squama opaque white with light brown margin, halter dark brown.

Abdomen black with typical white posterior tergal fasciae occupying about one-fourth of each segment (pl. 1, fig. 3 and pl. 5, fig. 29), entire dorsum covered with sparse, short, appressed, white pile (pl. 1, fig. 3); sternites I and most of II black, median area brownish black, III–V brownish black with posterior margins a dirty white, wider medially, abruptly narrowed laterally; posterior white margins of IV–V occupy four-fifths of each segment medially.

Genitalia dark brown and black; aedeagus as shown in plate 7, figure 41; ejaculatory apodeme as in plate 6, figure 32.

FEMALE: Length of entire specimen 5.50 mm., wing length 6.70 mm. The same as described for the male except: Thoracic and abdominal pile with a slight golden tinge; pleural area immediately below wing base of several shades of brown; upper corner of metanotum brownish black; legs entirely black except knees narrowly brownish black; r-m crossvein and vein M_1 more pronounced; costal cell somewhat infuscated; posterior white tergal fasciae about one-half as wide; sternites mostly brownish black with dirty white posterior margins.

FIRST-INSTAR LARVA: Planidium consisting of 12 segments, each with various types of setae; a pair of granular eyes are located anteriorly on head; mouthparts consist of a pair of oral hooks and a strong buccopharyngeal armature; the penultimate segment has a pair of dorsal spiracles whose trachae branch once and run up into head segment; caudal segment consists of several pairs of distinct setae and hooks and a sucking plate (see pl. 2, figs. 4, 5).

PUPA: Apparently not differentiated from other known species (see pl. 1, fig. 1).

HOLOTYPE: Male, Sardine Creek, Mono County, Calif., elevation 8,500 feet, July 12, 1951 (E. I. Schlinger, CAS).

ALLOTYPE: Female, same data except June 28, 1951 (J. W. MacSwain, CIS).

PARATOPOTYPES: 914 specimens, 171♂, 743♀: 15♂, 13♀, June 28, 1951 (A. T. McClay); 60♂, 165♀, June 28, 1951 (J. W. MacSwain); 3♂, 2♀, June 28, 1951 (R. W. Morgan); 2♂, 1♀, June 28, 1951 (E. L. Silver); 4♂, June 28, 1951 (C. A. Downing); 20♂, 33♀, July 6, 1951 (A. T. McClay); 7♂, 94♀, July 11, 1951 (A. T. McClay); 8♀, July 11, 1951 (E. L. Silver); 8♂, 1♀, July 11, 1951 (R. W. Morgan); 3♂, July 11, 1951 (C. A. Downing); 21♂, 257♀, and ♂♀ in copula, July 12, 1951 (R. C. Bechtel); 1♂, 21♀, July 12, 1951 (W. H. Lange); 1♂, 12♀, July 12, 1951 (E. J. Taylor); 22♂, 132♀, and 3♂♀ in copula, July 12, 1951 (E. I. Schlinger).

Paratopotypic specimens will be deposited in lots of 10 or 20 in the following collections: AMNH, BMNH, CAS, CHM, CNM, CM, CMNH, CSDA, CU, CWS, DEI, FRC, INHS, ISC, MCZ, OSC, PANS, TAM, UBC, UCLA, UI, UK, UN, USNM, UM, UW, VNM, and WSC. Other paratopotypes have been deposited as follows: 205 specimens in the CIS collection, 192 specimens in the UCD collection, and 140 specimens in the author's collection.

PARATYPE VARIATION: The leg coloring varies somewhat, remaining black in the female, while a few males have the distal one-half of the femora dark brown. The squama, particularly in the female, is whitish opaque, light brown, or rarely heavily, evenly infuscated, the margins being white to black. The wing is hyaline in the male, while in the female it ranges from hyaline to quite heavily infuscated, the latter trait being rare and characteristic of large individuals. The wing veins are pale, light or dark brown, and commonly darker in the female. Vein M_1 and r-m crossvein, although always present, are faint in a few specimens. The male genitalia do not vary significantly.

This species is closely related to *boharti*, and somewhat less so to *pallidipennis*, a species with which it has been confused. The melanic coloration of *adaptatus* will usually distinguish it from other Nearctic members of the *pallidipennis* group, and the male genitalia occupy a rather intermediate position between *boharti* and *pallidipennis* (compare pl. 7, figs. 36, 41, 42). None of the topotypical specimens of *adaptatus* suggest *pallidipennis* in coloration, but rather resemble *malampus*, which is a member of the *eugonatus* group.

DISTRIBUTION: Western North America from southern California to Alaska (as shown in text fig. 9). Most of the specimens reported by Sabrosky (1948) as western *pallidipennis* have been examined, and those with the rather brownish black habitus were actually females of *adaptatus* in a teneral or postovipositional stage. Those specimens which he recorded from Arizona, British Columbia, Mexico, New Mexico, and Washington have been carefully studied and were found

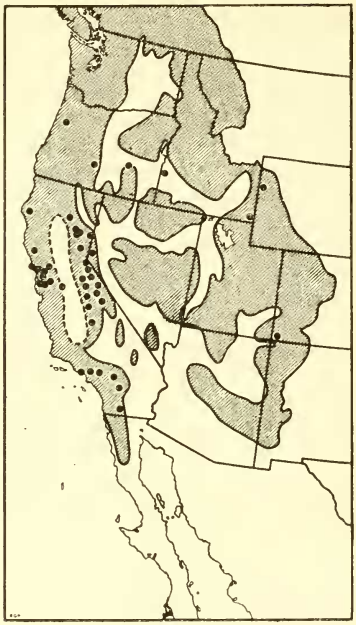

FIGURE 9.—Distribution of *Ogcodes adaptatus*, new species, in the United States.

to be one of three species, *boharti*, *borealis*, or *pallidipennis*. Since Sabrosky (1948) gave precise records of *adaptatus* for some 80 specimens, only those specimens representing new records are given below.

NEW DISTRIBUTION RECORDS: (363 specimens, 201 ♂, 162 ♀.)

ALASKA: 1 ♂, Alaska Highway, M.P. 1351, July 9, 1952 (C. P. Alexander, MSC); 1 ♂, Eagle, July 18, 1936 (F. Grinnell, EIS); 1 ♀, Livengood, July 30, 1954, "dead on window sill" (R. Coleman, USNM).

CALIFORNIA: 119 ♂, 76 ♀, and 4 pairs in copula, Bolinas, Marin Co., from April 6 to Oct. 15, 1947, to 1953 (R. M. Bohart, R. C. Bechtel, A. A. Grigarick, and E. I. Schlinger, USNM, EIS, UCD); 1 ♂, 1 ♀, Vallejo, Solano Co., Aug. 31, 1953 (E. I. Schlinger, EIS); 3 ♂, 13 ♀, Hallelujah Jct., Lassen Co., July 17, 1953 (E. I. Schlinger, EIS); 1 ♀, same place, July 12, 1954 (R. M. Bohart, UCD); 1 ♂, same place, July 4, 1949 (A. S. Deal); 1 ♀, same place, June 27, 1949 (R. L. Sisson); 1 ♂, same place, reared, May 30, 1950 (E. I. Schlinger, all EIS); 1 ♂, 1 ♀, Pinecrest, Tuolumne Co., July 25 and Aug. 2, 1947 (P. H. Arnaud, PHA); 1 ♀, same place, July 4, 1951 (S. M. Kappos, EIS); 1 ♀, same data (?), July 3, 1951 (C. A. Downing, EIS); 1 ♂, 1 ♀, Dinky Creek, Fresno Co., July 16, 1955 (R. X. Schick, UCLA); 10 ♂ and 8 ♀, reared, also 4 pupae and 3 larvae, Luther Pass, Grass Lake, El Dorado Co., July 24, 1955 (J. C. Downey, E. I. Schlinger, EIS); 1 ♂, Stanford University, Santa Clara Co., Aug. 20, 1949 (P. H. Arnaud, PHA); 2 ♀, Sagehen, near Hobart Mills, Nevada Co., June 25, 1954 (R. M. Bohart, R. C.

Blaylock, EIS, UCD); 1 ♀, Tapia Park, Santa Monica Mts., Los Angeles Co., June 12, 1954, reared (R. X. Schick, EIS); 2 ♀ (topotypes) July 17, 1953 (E. I. Schlinger, EIS); 1 ♀, Ash Mountain Reservation, Sequoia National Park, July 14, 1952 (R. C. Bechtel, EIS); 1 ♀, Biledo Meadow, Madera Co., July 11, 1946 (C. O. Eads, UCLA); 1 ♂, South Forks Meadow, June 25, 1948 (J. L. Sperry, ALM); 1 ♀, Del Rey (Banks Collection, Clarke, ALM); 4 ♂, 1 ♀, Niles, Aug. 22 to Sept. 5, 1932 (A. E. Michelbacher, CIS, USNM); 1 ♂, Pleasonton, Aug. 17, 1932 (A. E. Michelbacher, CIS); 1 ♂, Mill Creek, San Bernardino Co., 7,400 ft., June 29, 1942 (R. M. Bohart, EIS); 2 ♂, Tide Flat, Oakland, May 30, 1937 (E. S. Ross, CAS, GEB); 1 ♂, 2 ♀, Sebastopol, May 11 to 25, 1936 (A. T. McClay, UCD); 1 ♂, Buck's Lake, Plumas Co., July 14, 1949 (J. W. MacSwain, CIS); 1 ♀, Fish Canyon, San Gabriel Mts., Los Angeles Co., Apr. 27, 1949, reared (E. I. Schlinger, EIS); 1 ♀, Mt. Laguna, San Diego Co., July 5, 1950 (D. Cox, CIS); 1 ♀, Sunol, Alameda Co., May 24, 1933 (G. E. Bohart, GEB); 1 ♀, Round Valley, Inyo Co., July 27, 1947 (A. C. Michener, UK); 1 ♀, Mammoth Lakes, Mono Co., July 29, 1940 (L. J. Lipovsky, UK) [recorded as *rufoabdominalis* by Sabrosky, 1948, p. 420]; 1 ♀, Shingletown, Shasta Co., June 27, 1947 (T. F. Leigh, CIS); 1 ♀, Quincy, Plumas Co., June 21, 1949 (W. R. Schreader, EIS); 1 ♂, Yosemite, Tuolumne Co., June 10, 1928 (E. O. Essig, CIS); 1 ♂, Isberg Pass, Yosemite, July 30, 1940 (E. G. Linsley, CIS); 1 ♂, Hope Valley, Alpine Co., July 9, 1948 (S. A. Sher, CIS); 10 ♂, 2 ♀, Paradise Cove, Marin Co., May 3 to 18, 1947 (E. L. Kessel, CAS) [recorded as *pallidipennis* by Kessel, 1948]; 1 ♂, 3 ♀, Thompson Ranch, Grizzly Island, Solano Co., Aug. 21, 1952 (A. D. Telford, EIS); 1 ♂, Oakland, Alameda Co., August 1905 (E. C. Van Dyke, CAS) [det. as *melampus* by C. W. Johnson].

Colorado: 5 ♂, Ute Creek, 9,000 ft., July 2, 5, 19 and Aug. 7 (H. S. Smith, L. Bruner, R. W. Dawson, UN, EIS).

Idaho: 1 ♀, Prince Hardesty Res., Owyhee Co., July 3, 1954 (A. J. Walz, UI); 5 ♂, Marsing, Owyhee Co., Sept. 9, 1948 (A. Walz, UI, WSC, EIS); 1 ♂, Lava Hot Springs (D. E. Johnson, BYU).

Nevada: 2 ♂, 17 ♀, northwest side of Washoe Lake, Washoe Co., June 16, 1952 (E. I. Schlinger, EIS); 11 ♂, Minden, Douglas Co., June 11, 1957 (R. W. Lauderdale, EIS); 1 ♀, 9 mi. W. Fallon, Churchill Co., Sept. 18, 1957 (R. C. Bechtel, EIS).

Northwest Territories: 1 ♀, Yellowknife, July 20, 1949 (R. R. Hall, CNM).

Oregon: 3 ♂, 3 ♀, Corvallis, May 18, 1951 (V. Roth, J. Capizzi, OSC, EIS); 5 ♀, Rest Lake, near Summer Lake, Lake Co., July 23, 1944 (D. C. Mote, OSC); 1 ♂, 1 ♀, Fish Lake, Steen's Mts., Harney Co., July 14, 1953 (Roth and Beer, OSC).

Wyoming: 1 ♂, Wilson, July 22, 1926 (R. W. Haegele, UI); 1 ♀, Fhayne, July 26, 1952 (W. Furniss, USNM).

Yukon Territory: 1 ♂, 1 ♀, Dawson, July 8, 1949 (W. W. Judd, CNM).

Seasonal occurrence: Both males and females have been taken from Apr. 6 to Oct. 15 at Bolinas, Calif.; all the specimens from northern Canada and Alaska are dated July.

New host records: 27 specimens were reared from the following spiders, all collected in California. Nos. 7, 8, and 9 were observed by Mr. R. X. Schick of the University of California at Los Angeles, while the other specimens were reared by the author.

(1) *Pardosa sternalis* Thorell (?), immature, collected at Hallelujah Jct., Lassen Co. Parasite (♂) first noticed as teneral adult on May 30, 1950, died June 6, 1950.

(2) *Hololena* species, immature, collected at Fish Canyon, Los Angeles Co. Parasite (♀) emerged from host May 16, 1949, pupated May 18, emerged as adult May 24, and died May 29, 1949.

(3) *Pardosa sternalis* Thorell (?), immature, collected at Bolinas, Marin Co. Parasite (♀), emerged from host Jan. 13, 1950, pupated Jan. 14, emerged as adult Jan. 17, and died Jan. 20, 1950.

(4) *Pardosa sternalis* Thorell (?), immature, collected at Bolinas. Parasite (♀) emerged from host Oct. 10, 1949, pupated Oct. 12, emerged as adult Oct. 16, and died Oct. 20, 1949.

(5) *Pardosa sternalis* Thorell (?), immature, collected at Bolinas. Parasite (♀) emerged from host Jan. 17, 1950, pupated Jan. 19, emerged as adult Jan. 23, and died Feb. 4, 1950.

(6) *Pardosa sternalis* Thorell (?), immature, collected at Bolinas. Parasite (♀) emerged from host Oct. 10, 1949, pupated Oct. 12, emerged as adult Oct. 16, and died Oct. 19, 1949.

(7) *Xysticus cunctator* Thorell, immature, collected at Tapia Park, Los Angeles Co. Parasite (♀) emerged as adult June 12, 1954.

(8) *Xysticus cunctator* Thorell, immature, collected at Tapia Park, Los Angeles Co. Parasite (♀) emerged from host May 1, 1954, pupated May 3, emerged as adult May 5, 1954.

(9) *Philodromus* species, immature, collected at Sunland, Los Angeles Co. Parasite (♀) emerged as adult May 5, 1955.

(10–27) 9♂ and 9♀ parasites were reared from spiders collected at Luther Pass, El Dorado Co., July 24, 1955. The hosts for those that could be associated were *Pardosa* species, all immature. The parasites were collected under pieces of cow dung in a meadow either in the form of larvae, prepupae, or pupae. No accurate dates of developmental stages were kept, but the dates of adult emergence were from July 29 to Aug. 3, 1955.

Biology: From the above rearing data it can be said that the average posthost developmental periods were as follows: Emergence from host to pupation, 1.8 (1–2) days; pupal period, 3.8 (3–7) days; longevity of the adults under laboratory conditions, 6.6 (3–12) days. These few records compare well with those cited earlier for *pallidipennis*; only the pupal period of the latter differed to any extent—6.6 days as compared to 3.8 days for *adaptatus*.

The only published biological data which definitely can be associated with *adaptatus* were those of Kessel (1948). He observed the mating habits and was impressed by finding the flies rather gregarious, or at least common around only certain of the many *Juncus* plants in the area. Sabrosky (1948, p. 417) reported that some specimens had been stored by a crabronid wasp in Arizona, but these specimens actually represent the species described below as *boharti*, new species.

It seems worth-while at this point to make a few notes on the ecology of the type locality, and to describe the manner in which the unusually large type series was collected. Sardine Creek, Calif., the type locality, is a typical Sierran meadow at an elevation between 8,400 and 8,600 feet, just on the east side of Sonora Pass, and thus east of the Sierra Divide. The meadow contains a fairly swift and

narrow creek, which is unevenly bordered by several types of meadow grass, wild flowers, and a species of *Iris*. The grassy area is rather narrow, usually not more than 25 feet from the water to the higher ground. At the junction of the grass area and the higher ground, large patches of sagebrush, *Artemisia* species, is located. It was in this grassy area that the preponderance of spiders was observed, and it was on the dead twigs of the *Artemisia* that J. W. MacSwain and A. T. McClay first collected their specimens on June 28, 1951. On July 12, 1951, I made a special trip to this location to check the remarkable account given by the primary collectors. The trip resulted in the following observations.

The black parasite eggs were so thick on the dead outer twigs that they were easily noticed at a distance of 20 or more feet. Upon closer examination, large numbers of adult female flies, sometimes as many as 20 to 30 per twig, could be seen slowly walking up or down the twig laying about one egg every 3 to 4 seconds in a very rhythmic fashion. Some of the twigs were test-counted, and it was estimated that they contained from 15,000 to 20,000 eggs per linear foot. Occasionally a male landed on a twig, but most of the males observed and collected were found flying among, or resting upon, the inner branches of the sagebrush. Since most of the specimens of *adaptatus* were collected by actually picking them from the dead twigs by hand, the absence of males and the preponderance of females is self-explanatory. It was noted, also, that about one-tenth of the available dead twigs contained large masses of eggs and/or adult flies. The dead twigs themselves were uncommon, and in no case were these twigs observed with only a few eggs.

Considering this last statement, it would seem that some sort of association mechanism was acting on the adult females; otherwise, some twigs would have been found with either a few eggs, a few adults or a few of both. Whether this is a sight or smell relationship I am not sure, but the rapid rate of egg laying, together with the large number of adults found per twig, indicated a "follow-the-leader" condition in which somehow the females were attracted to the site where the first female began her egg deposition. I observed this condition also at Bolinas, Calif., on *Juncus patiens* E. Meyer, and at Washoe Lake, Nev., on *Chrysothamnus* species. Kessel's observations (1948) would also suggest this condition.

A few topotype females were also observed laying eggs on the dead flower stalks of an *Iris* species which was adjacent to the sagebrush. These stalks also bore large masses of eggs.

The first-instar larvae were seen "crawling" or "standing" on the egg masses in typical *Ogcodes* fashion (see main biology section), so

that they could either contact the spider host on the twigs at night or drop to the ground to encounter their host.

The spiders which prevailed in this area were mostly *Pardosa* species, including the common host species *sternalis* Thorell. These hosts were common only in the grassy and wetter part of the meadow, and were not seen venturing far onto the higher and dryer ground. This is significant, since the adult parasites were likewise neither encountered flying nor laying eggs much beyond the margin of the wetter area. Thus, the parasite-host relationship seemed well established along this line. Although no parasites from the type locality were reared, several pupae were found under rocks and dead twigs lying on the ground in the wet area.

The entire type series (914 specimens) was collected between June 28 and July 12, 1951, and although the author made another trip to the locality on Aug. 1, 1951, no specimens could be found in the area where only three weeks earlier the flies were present literally by the thousands. This suggests that the active adult period at this altitude is quite limited as compared with the sea level locality of Bolinas, Calif., where adult males and females have been collected from Apr. 6 to Oct. 15. On July 17, 1953, the author again visited the type locality. No specimens of either sex were located, nor could any trace of eggs be seen. This certainly indicates that the presence of these parasites is definitely cyclic and periodic.

Another series of specimens was collected under interesting conditions at Luther Pass, Calif., on July 24, 1955, by J. C. Downey and the author. Both pupae and larvae were collected underneath cow dung along the marshy margins of Grass Lake. The *Pardosa* species apparently seeks a protected and somewhat dry place just prior to molting, and in this meadow marsh cow dung (especially older pieces) was used for this purpose. Most often the molting spot can be detected by the presence of the thin protective spider web, and almost all of these were found in or near the old scarab or histerid beetle holes in the cow dung. These afforded considerable protection to the spiders. On several occasions two or three larvae or pupae of *O. adaptatus* were found under a single piece of dung, and perhaps 20 percent of the pieces examined contained some example of the parasite. Although several adult males were collected, no egg sites were located, probably because it was just the beginning of the emergence period in this area.

This species was reported by Bechtel and Schlinger (1957) (*Ogcodes* "species #2") as having been stored as prey by a crabronid wasp in San Bernardino Co., Calif.

***Ogcodes (Ogcodes) hennigi*, new species**

PLATE FIGURES 45, 80, 100

Species of group v.

MALE: Length of entire specimen 4.50 mm., wing length 3.75 mm., as described for *adaptatus*, new species, except as follows:

Head with brown eyes.

Thorax with upper margin of postalar callus light brown; r-m crossvein present but not distinct; venation about as in plate 3, figure 11; squama with whitish margin.

Abdomen with posterior white tergal fasciae covering about one-third of segments III–V, narrower on I and II; dorsal pile about as long as tarsal claw, sparse, not appressed; venter mostly white, including one-half of sternite II and most of I.

Genitalia brown; aedeagus as in plate 8, figure 45; ejaculatory apodeme as in plate 11, figure 80, and plate 13, figure 100.

FEMALE: Unknown.

HOLOTYPE: Male, Orient, Long Island, New York, June 14, 1954 (Roy Latham, USNM 64442).

REMARKS: This rather unique species is apparently connected with the European species *gibbosus* and *varius*, and although it is not phylogenetically related to any Nearctic species, it superficially resembles *adaptatus;* hence, the reference to the latter species in the above description. The aedeagus (pl. 8, fig. 45) of *hennigi* is distinct from all known species, but the ejaculatory apodeme, particularly the ventrally incomplete basal cell, points to a Holarctic connection (compare pl. 13, figs. 100 and 109 of *varius*), as well as other possibly related species with a similar development (see pl. 13, figs. 99, 101, 108, 112).

This species is named for Dr. Willi Hennig, who has been of great assistance to me in this and other acrocerid projects.

***Ogcodes (Ogcodes) boharti*, new species**

PLATE FIGURES 42, 104

Ogcodes pallidipennis (western subspecies ?), Sabrosky, in part, Amer. Mid. Nat., vol. 39, pp. 417–418, 1948 (not Loew, 1865).

Species of group v.

MALE: Length of entire specimen 5.5 mm., wing length 4.75 mm.

Head reddish brown except black ocellar tubercle and grayish black occiput and frons.

Thorax black except for light brown anterior angles of metanotum, and dark brown posterior tip of humerus, pleura below (light brown above), and large white interpleural area; most of thorax covered with short, nearly erect, yellowish white pile, a little longer on pro-

pleura; legs dark brown, only apical three-fourths of femora and knees lighter brown; wing brownish hyaline, vein M_1 and crossvein r-m present, m-cu crossvein absent, vein M_1 a little longer than R_{4+5}, veins M_2 and M_4 dark brown but other M veins light brown (about as in pl. 3, fig. 11); squama quite infuscated, semitransparent, margin darker brown, halter knob dark brown, stem light brown.

Abdomen with typical *Ogcodes* pattern as in plate 5, figure 29, tergites dark brown, nearly black, the brownish white posterior fasciae occupying about one-fifth of each segment, dorsum covered with sparse, short white pile; sternites I–II dark brown, III–VI mostly brownish white, the anterior one-fourth of III–VI darker brown.

Genitalia dark brown; aedeagus as in plate 7, figure 42; ejaculatory apodeme as in plate 13, figure 104.

FEMALE: Unknown.

HOLOTYPE: Male, Oak Creek Canyon, Arizona, elevation 4,000–5,000 feet, June 11, 1940 (G. E. Bohart, CAS).

PARATOPOTYPES: 1 ♂ (G. E. Bohart, UCLA); 9 ♂, June 8, 1940, "collected from *Crabro* nest" (G. E. Bohart, GEB, USNM, EIS).

PARATYPE: 1 ♂, Huachuca Mts., Arizona, Aug. 24, 1934 (USNM).

PARATYPE VARIATION: Head reddish brown to dark brown; upper margin of postalar callus ranging to light brown, narrowly white in one male; posterior margin of humerus sometimes light brown; parts of femora and tibiae occasionally light to medium brown, when light brown the color contrasts sharply with the dark brown coxae; squama hyaline to nearly opaque, light to dark brown throughout, halter light to dark brown, the stem usually darker than in holotype; genitalia with no appreciable differences.

REMARKS: Though not strikingly different in color from *adaptatus*, *pallidipennis*, or *sabroskyi*, *boharti* differs mainly in having the wing membrane evenly brownish hyaline and by the male genitalic structures. In some respects the ejaculatory apodeme resembles that of *gibbosus*, but other features do not indicate a very close relationship. The closest relative of *boharti* is probably *adaptatus*, the two differing primarily in the general coloration, wing infuscation, and the structure of the male genitalia.

The 9 male paratopotypes were recorded by Sabrosky (1948) as "west subsp. of *pallidipennis*." Bechtel and Schlinger (1957), in their summary of acrocerid-crabronid relationships, referred to this species as *Ogcodes* "species #1," and it seems quite probable, on the basis of available evidence, that the crabronid wasp involved was a species of the genus *Ectemnius* rather than *Crabro*.

This species is named for George E. Bohart, the collector, who offered me not only his large personal collection for study but also some valuable information concerning the family Acroceridae.

***Ogcodes (Ogcodes) canadensis*, new species**

PLATE FIGURES 49, 105

Species of group v.

MALE: Length of entire specimen (head missing) 3.40 mm., wing length 3.88 mm.

Thorax entirely shining black, covered with short yellowish white pile; legs black, except for brown fore and mid tibiae, even light brown along inner margin, fore and mid tarsi somewhat browned, pulvilli grayish black; wing hyaline, only costal veins dark brown, vein M_1 present but faint, r-m crossvein present but short and faint, m-cu crossvein absent, vein M_2 short and pale, vein M_4 truly veinlike only after bend near r-m crossvein (venation about as in fig. 11); squama opaque white except for large dark brown basal spot which is more transparent than rest of squama, squamal margin dark brown, halter black, stem white.

Abdomen black, covered with short, sparse, white pile, tergites II–VI with narrow yellowish white posterior fasciae, each occupying about one-sixth of each tergite, tergite I black; sternites II–VI brownish black with fasciae as on tergites but slightly wider, sternite I entirely brownish black.

Genitalia dark brown; aedeagus as in plate 8, figure 49; ejaculatory apodeme as in plate 13, figure 105.

FEMALE: Unknown.

HOLOTYPE: Male, Houghron, Ontario, Canada, July 26, 1951, Forest Insect Survey, No. 051–1406 (CNM).

PARATYPE: 1 ♂, Ottawa, Canada, July 26, 1942 (A. Brooks, CNM).

REMARKS: Although *canadensis* possesses characters that are intermediate between *boharti* and *sabroskyi*, it appears to be closely related only to the latter (see text fig. 2). The features of the aedeagus and the dark basal squamal spot easily separate *canadensis* from all other Nearctic *Ogcodes* species. The paratype male of this melanic species agrees essentially with the holotype, but the abdominal fasciae are nearly white, and the squamal spot is slightly less infuscated.

***Ogcodes (Ogcodes) sabroskyi*, new species**

PLATE FIGURES 44, 107

Species of group v.

MALE: Length of entire specimen 3.30 mm., wing length 2.90 mm.

Head reddish brown, occiput black, narrow, flattened behind.

Thorax covered with very short golden appressed pile, that on scutellum somewhat longer and less appressed, black except for dark brown anterior angle of metanotum, and blackish brown over most of plura with several large white interpleural areas above; pile of pro-

pleuron longer and more erect than on mesonotum; legs black except that basal three-fourths of tibiae are light brown; wing hyaline, vein M_1 present but weak, longer than R_{4+5}, crossvein r-m pale, nearly reaching bend in vein M_4, vein M_2 present but quite pale, m-cu crossvein absent (venation about as in pl. 3, fig. 11); squama semitransparent, slightly browned throughout, margin dark brown, halter knob brown.

Abdomen dark brown, rather narrow, with typical *Ogcodes* pattern (pl. 5, fig. 29) except that posterior tergal fasciae are of nearly even length throughout and occupy only one-sixth of each tergite, entire dorsum covered with sparse, short, golden, slightly appressed pile; sternites dark brown except for whitish brown in median area of II, sternites III–VI mostly whitish brown but of same pattern as II.

Genitalia dark brown, quite small; aedeagus as in plate 8, figure 44; ejaculatory apodeme as in plate 13, figure 107.

FEMALE: Unknown.

HOLOTYPE: Male, Currahee Mt., Stephens Co., Georgia, July 23, 1952 (H. R. Dodge, USNM 61729).

PARATOPOTYPE: 1 ♂ (CAS).

PARATYPE: 1 ♂, Kennesaw Mt., Cobb Co., Georgia, June 15, 1952 (Dodge, Sudia, Seago, EIS).

According to information received from H. Dodge in a letter (1953), "the flies were taken from the hand rail of the observation tower on the top of Currahee Mountain, and though quite sluggish, were not easily taken by net." He also said several more specimens were seen but could not be caught. To my knowledge, specimens of *Ogcodes* have been collected nearly everywhere except on mountain tops. The only other record of this sort was cited by Brunetti (1920, p. 171) for *Ogcodes angustimarginatus* Brunetti in Ceylon. His specimen was likewise a male, and it may be that further collecting on mountain tops would yield some good records of this and other genera of Acroceridae.

REMARKS: *O. sabroskyi* has affinities with *adaptatus*, *boharti*, *canadensis* and *pallidipennis*, though in its distribution it approaches only the last-named species. It is believed to be the most highly evolved species of the *pallidipennis* group in the Nearctic subregion, and most closely related to *canadensis* (see text fig. 2). The following combination of characters will separate *sabroskyi* from other *Ogcodes* species: the narrow posterior tergal fasciae, golden pile, narrow abdomen, and structure of male genitalia. The aedeagus of *sabroskyi* resembles that of the Palaearctic *gibbosus*, but this apparently is a case of convergence, as other morphological features are quite distinct.

It is a pleasure to name this species after Mr. Curtis W. Sabrosky, whose recent studies on the family Acroceridae have contributed much

to the understanding and clarification of this group, and who has so generously given me help on this and other projects now in progress.

Ogcodes species

Several specimens examined could not be placed with any degree of certainty. It is possible that they represent new species or subspecies, or that they are merely variations of known species whose limits have not yet been determined.

(1) *Ogcodes* species similar to *adaptatus* but differing mainly in the very small size and in having the aedeagus somewhat depressed apically.

California: 3 ♂, 2 ♀, Mill Valley, Marin Co., July 6, 1924 (E. P. Van Duzee), Sept. 11, 1949 and June 27, 1950 (E. S. Ross), June 12, 1950, in cheesecloth trap, and June 30, 1950 (H. B. Leech, all in CAS); 1 ♂, Fallen Leaf Lake, Lake Tahoe, El Dorado Co., Aug. 1931 (O. H. Swezey), and 1 ♀, same data, July 14, 1915 (E. C. Van Dyke, both in CAS); 1 ♂, "Idlewild" (probably Idyllwild), July 5, 1928 (E. C. Van Dyke, CAS). Some of the above specimens were recorded by Sabrosky (1948) as "west. subsp. of *pallidipennis*."

(2) *Ogcodes* species near *boharti*, *pallidipennis*, and *adaptatus*. There are four specimens which seem to differ sufficiently from the above-named species (mostly by coloration, and when males, by the genitalia) that their identity is questioned.

Arizona: 1 ♀, White Mts., June 19, 1950 (P. P. Cook, UK); 1 ♂, Oak Creek Canyon, July 9, 1941 (R. H. Beamer, UK) [this is definitely not *boharti*]; 1 ♂, Sunnyside Canyon, Huachuca Mts., July 9, 1940 (E. E. Kenaga, UK).

New Mexico: 1 ♂, Ruidosa, June 26, 1940 (R. H. Beamer, UK). The last three specimens listed were recorded by Sabrosky (1948) as "west. subsp. of *pallidipennis*."

(3) *Ogcodes* species, probably *borealis* or *eugonatus* (wings broken off).

Wisconsin: 1 ♀, University Arboretum, July 1, 1946 (J. R. D., UW).

Ogcodes (*Neogcodes*), new subgenus

Type species: *Oncodes albiventris* Johnson, by present designation.

Diagnosis: Differs from subgenus *Ogcodes* as follows: Antennal segment III short, not more than three times longer than broad, its apex beset with five or six long setae, each about one-half as long (male) or as long as segment III (female) as shown in plate 5, figure 23; antennal sensory pit large. Proboscis minute but visible, not covered by membrane in dead specimen, rather shining. Wing venation as in plate 4, figure 17.

Discussion: At the present time only the Nearctic *albiventris* can be placed in this subgenus; however, it seems likely that more may be included when other little-known species can be carefully studied.

This subgenus apparently represents the most highly evolved form of the subfamily Acrocerinae, and was evolved from species of the *colei* group of the subgenus *Ogcodes*, appearing to be most closely related to the uncommon *vittisternum* (see text fig. 2).

The antennae of subgenus *Neogcodes* show a definite resemblance to certain species of *Pterodontia* Gray, but this similarity is no doubt due to convergence rather than to any direct inherited development.

***Ogcodes* (*Neogcodes*) *albiventris* (Johnson)**

PLATE FIGURES 17, 23, 30, 65, 92

Oncodes albiventris Johnson, Psyche, vol. 11, p. 18, 1904.

Ogcodes albiventris, Cole, Trans. Amer. Ent. Soc., vol. 45, p. 67, 1919; Psyche, vol. 30, p. 47, 1923.—Sabrosky, Amer. Mid. Nat., vol. 31, p. 390, 1944; Amer. Mid. Nat., vol. 39, p. 423, pl. 1, figs. 8–9, 1948.

DIAGNOSIS: MALE: Antenna light brown, segment III not much longer than I and II (pl. 5, fig. 23); head, thorax, coxae, trochanters, basal one-third to one-fourth of femora, apex of last tarsal segment, claws, halter knob and small spots on abdomen, black; abdomen white, marked more or less as in plate 5, figure 30; dorsum covered with long, dense, whitish yellow pile, about as long as hind metatarsus; wing venation weak, vein M_1, r-m and m-cu crossveins absent (pl. 4, fig. 17); aedeagus as in plate 10, figure 65; ejaculatory apodeme as in plate 12, figure 92.

FEMALE: Same as described for male except as follows: antennal segment III about one-third shorter than in male; abdomen almost entirely black, patterned about as in plate 5, figure 29, but white fasciae extremely narrow, those on sternites slightly wider; abdominal pile not quite as long as in male, and much less dense; cerci light brown; legs mostly light brown, only coxae, trochanters and apices of tarsi with some black, knees white.

HOLOTYPE: 1 ♂, Toronto, Ontario, Canada, July 18, 1896 (MCZ).

DISTRIBUTION: Until the present, this species has been known from only the holotype male from Canada and another male from Livermore, Calif. (recorded by Cole, 1923, later studied by Sabrosky, 1948). The examination of five more specimens, including the first female, has shown that *albiventris* ranges widely throughout northern United States and southern Canada, yet individuals of the species remain quite rare.

NEW DISTRIBUTION RECORDS: (5 specimens.)

BRITISH COLUMBIA: 1 ♂, Robson, Waldies Rd., June 29, 1947 (H. R. Foxlee, CNM).

CALIFORNIA: 1 ♀, Topaz Lake, Mono Co., June 26, 1957 (A. E. Pritchard, CIS); 1 ♂, Palo Alto, July 22, 1892 (CM).

MICHIGAN: 2 ♂, Muskegon, July 4, 1906 (C. A. Hill, CAS, EIS).

Discussion: The male of *albiventris* is distinguished from all other New World species of *Ogcodes* by the strikingly patterned abdomen; however, the female (aside from subgeneric features) is hardly differentiated from a number of species, particularly those of the *colei* group. The closest relative of *albiventris* is no doubt *vittisternum*, but *colei*, *shewelli*, and *floridensis* are also related.

Ogcodes species of Neotropical region

There are now nine species known to occur in this region. Two of these, *dispar* (Macquart) and *pallidipennis* Loew, are primarily Nearctic in distribution and reach into this region only as far south as Costa Rica. Four of the species are found in Chile and its islands, i.e., *chilensis* Sabrosky, *kuscheli* Sabrosky, *porteri* Schlinger, and *triangularis* Sabrosky. The three remaining species are herein described as new and are known only from their respective type localities. These are *argentinensis*, new species; *brasilensis*, new species; and *colombiensis*, new species.

At least four species groups are found in this region, and it seems very probable that more will be uncovered when future collecting permits, since the first species of *Ogcodes* was only recently described from this region by Sabrosky (1945).

Ogcodes (*Ogcodes*) *colombiensis*, new species

Plate figures 40, 108

Species of group v.

Male: Length of entire specimen 5.30 mm., wing length 4.55 mm.

Head reddish brown, occiput black and narrow; antenna with one seta on apex of style.

Thorax with only central part of mesonotum black, remainder brown, that of humerus and parts of pleura light brown, whole thorax covered with short light brown pile; legs mostly light brown, hind femur and tibia infuscated, the apices of tarsi nearly black as are pulvilli; wing evenly infuscated light brown, costal area somewhat darker, vein M_1 distinct, longer than R_{4+5}, reaching to margin of wing, r-m crossvein present but short, vein M_2 present and distinct, all veins dark brown; squama opaque, yellowish brown, margin darker, entirely covered with white pile; halter brown, its stem somewhat paler.

Abdomen with tergites i–vi mostly brownish black with yellowish white posterior fasciae as in plate 5, figure 29, tergites ii–iv each with submedian light brown oval spot, somewhat as in *guttatus*, though not as prominent; sternites white except that each one has a narrow anterior blackish brown fascia; dorsum entirely covered with very short, light brown pile.

Genitalia dark brown; aedeagus as in plate 7, figure 40; ejaculatory apodeme as in plate 13, figure 108.

FEMALE: Unknown.

HOLOTYPE: Male, 1 mile west of Villeta, Cundinamarca, Colombia, Mar. 8, 1955, elevation 860 meters, on top of rock pile (E. I. Schlinger, CAS).

REMARKS: Although the author spent seven months in Peru, Colombia, and Ecuador during 1954–1955, this male was the only *Ogcodes* specimen taken. This is one of the three species now known from this region outside of Chile and is therefore of especial interest from the standpoint of distribution.

The Nearctic species *dispar*, which ranges as far south as Costa Rica, is probably the nearest relative of *colombiensis*. On the basis of color, the latter species is similar to *chilensis*, which, however, is a member of the *eugonatus* group and therefore not closely related. *O. brasilensis*, which superficially resembles *colombiensis*, is actually quite different in the structure of the male genitalia and is apparently only related geographically. In the same way, *argentinensis* is more closely connected with Nearctic species than with *colombiensis*.

***Ogcodes* (*Ogcodes*) *brasilensis*, new species**

PLATE FIGURES 50, 106

Species of group v.

MALE: Length of entire specimen 6.60 mm., wing length 5.30 mm.

Head dark brown except for black occiput and light brown antenna; antenna with rather long, thin style which has one apical seta.

Thorax light brown except for reddish brown on three longitudinal vittae (median vitta present only for anterior three-fourths, lateral vitta present from wing base to postalar callus), lateral margins of scutellum, basal one-half of metanotum, spot on propleura, spot in front of prothoracic pleura and spot on tegula; metanotum plainly visible as abdomen is not highly arched anteriorly; notum entirely covered with short golden brown pile; legs mostly light brown except for dark brown anterior spot on mid and hind coxae, tarsal apices, claws and pulvilli; hind femur and tibia swollen apically and of nearly equal length; wing heavily infuscated throughout, veins strong and dark brown; vein M_1 present and reaching wing margin, r-m crossvein present only as an infuscated line, not a true vein, vein M_2 strong only distally where it reaches wing margin, m-cu crossvein absent, anal vein weak but nearly approaching Cu_2 at wing margin, anal axillary vein strong, arclike; squama nearly opaque, evenly dark brown, halter knob dark brown, its stem yellow.

Abdomen quite long and narrow, about two times longer than wide, rather evenly light brown with narrow whitish brown posterior tergal

fasciae with very narrow dark brown fasciae immediately preceding each fascia on tergites II–V; sternites light brown except for white posterior fasciae on II–V and dark brown anterior fasciae on II–IV; sternite VI is long and rather broadly overlapping tergite VI at lateral margin; both dorsum and venter covered with short brown pile.

Genitalia light and dark brown; aedeagus as in plate 8, figure 50, ejaculatory apodeme as in plate 5, figure 106.

FEMALE: Unknown.

HOLOTYPE: Male, Nova Teutonia, "27° 11′ B. 52° 23′ L.," Brazil, Apr. 22 (?), 1938 (Fritz Plaumann, BMNH 1939–66).

REMARKS: This is the first record of the genus for Brazil, and one of the seven species now known to occur in South America. It has no known close relative.

***Ogcodes (Ogcodes) argentinensis*, new species**

PLATE FIGURES 39, 103

Species of group v.

MALE: Length of entire specimen 3.50 mm., wing length 3.00 mm., as described for *adaptatus*, new species, except as follows:

Head with brown eyes, antenna light brown.

Thorax black except for brown mesopleural area, covered with short brown pile; legs dark brown except tibiae light brown and tips of tarsi black; wing venation about as in plate 3, figure 11, but M_1 and M_2 faint, r-m crossvein absent; squama opaque brown, halter stem light brown, knob dark brown.

Abdomen with posterior white tergal fasciae somewhat enlarged medially, dorsum covered with sparse, short, nonappressed brown pile, somewhat longer medially; sternites as in *adaptatus* except brown and white instead of black and white.

Genitalia brown; aedeagus as in plate 7, figure 39; ejaculatory apodeme as in plate 13, figure 103.

FEMALE: As described for *adaptatus* except as follows: legs mostly dark brown; parts of pleurae light brown; postalar callus, metanotum and apical margin of scutellum dark brown; abdomen dark brown with narrower posterior white tergal fasciae.

HOLOTYPE: Male, Chascomus, Buenos Aires, Argentina, Feb. 6, 1954 (Ibarra Grossa, USNM 64443).

PARATOPOTYPES: 2♂, 1 ♀ (EIS).

REMARKS: This is the first record of an *Ogcodes* species from Argentina. Although there are now nine species of this genus known from the Neotropical region, none of those described is apparently closely related to *argentinensis*, with the possible exception of *colombiensis*. It appears that the Nearctic *adaptatus* and *boharti* are most closely

related to *argentinensis*, but are easily distinguished by color patterns, the absence of r-m crossvein, and structure of the male genitalia.

One of the male paratypes measured only 2.5 mm. in length, being one of the smallest *Ogcodes* specimens I have examined. There was no significant difference noted in the paratype males examined.

Ogcodes (*Ogcodes*) *chilensis* Sabrosky

Ogcodes chilensis Sabrosky, Rev. Chil. Hist. Nat. (1944), vol. 48, p. 318, 1945.

Species of group II.

TYPES: Holotype ♂, Chile (ex collection of Vicuña), also a paratype ♂, Panguipulli, Chile (A. Hollermayer) both in the collection of Carlos Stuardo in Santiago, Chile.

DISCUSSION: I have not seen this species, but from the description and from notes on the holotype furnished by Prof. Carlos Stuardo, I feel quite sure it is a member of the *eugonatus* group. Its black to reddish black thorax and the yellow or orange spots on the foremargin of the mesonotum distinguish it from others of the region.

Ogcodes (*Ogcodes*) *triangularis* Sabrosky

Ogcodes triangularis Sabrosky, Rev. Chil. Hist. Nat. (1944), vol. 48, p. 317, fig. 1, 1945.

TYPE: Holotype ♂, Malloco, Chile, Apr. 1, 1935 (C. Stuardo, CS).

DISCUSSION: Species of group IV (?). Even though this species is known only from the holotype, it is quite distinct from the other Neotropical forms as noted in the key to species above. It is apparently closely related to *kuscheli*. Sabrosky noted that in color pattern it resembled certain *Acrocera* species, and in this feature it also approaches *O. porteri*.

Not having seen the holotype, I am unable at present to place this species in a group. However, judging from its apparent relationship to *kuscheli*, I have placed it tentatively in the *colei* group. The absence of vein M_1, however, suggests the *eugonatus* group, while the rather distinct color markings might relate it to the *porteri* group or to another closely related but unrecognized group. An examination of the male genitalia will no doubt quickly place this species in its proper group.

Ogcodes (*Ogcodes*) *kuscheli* Sabrosky

PLATE FIGURES 9, 59, 86

Ogcodes kuscheli Sabrosky, Rev. Chil. Ent., vol. 1, p. 189, 1951.

TYPES: Holotype ♂, allotype ♀, and 4 ♂, 1 ♀ paratypes, from Masatierra Island, Juan Fernandez Islands, Chile (P. G. Kuschel). (Holotype, allotype and 2 ♂ paratypes, Universidad de Chile collection in Santiago; 2 ♂, 1 ♀ paratypes, USNM.)

Discussion: Species of group iv. According to Sabrosky it is closely related to *triangularis*, and although vein M_1 is absent (except distally), the general wing venation is quite strong; r-m crossvein is complete, R_{4+5} is nearly complete and sinuous, vein M_2 is virtually complete, and the basal portion of the media and a two-branched cubitus are present.

The female of *kuscheli* is quite distinct from the male in coloration, the female having the thorax predominantly golden yellow with three black stripes, while the male thorax is all black.

Ogcodes (*Ogcodes*) *porteri* Schlinger

Plate figure 16

Ogcodes porteri Schlinger, Wasmann Journ. Biol., vol. 11, p. 319, figs. 1, 2, 1953.

Type: Holotype ♂, Viña del Mar, Chile, 1910 (Porter, INHM).

Discussion: Species of group vi. This species, which is known only from the holotype, is apparently one of the most highly evolved *Ogcodes*, judging from its simplified wing venation with veins M_1, M_2 and M_4 absent, and its extremely narrow anal area (pl. 4, fig. 16). It also has a very large head which is nearly as broad as the thorax, and a rather large ocellar triangle. The general color pattern is similar to that of certain species of the genus *Acrocera*.

Ogcodes species

A single female specimen of an apparently undescribed species was examined from 50 km. east of San Carlos, Nuble, Chile, Dec. 26, 1950 (Ross and Michelbacher, CAS). It is definitely a member of the *pallidipennis* group. This is the first representative of the group from Chile and shows that the group apparently is spread throughout the Neotropical region. The thorax is entirely dark brown and the tergal and sternal fasciae are white on a dark brown ground color, features typical of females of the *pallidipennis* group. This may be a female of *argentinensis*, but males will have to be examined from Chile to be sure.

Acrocerid Taxa and List of Ogcodes Species

Each entry is followed by the author of the taxon, the date of original publication, the next higher taxon (in parentheses), the referable taxon in case of a synonym, and page reference to the text with the most important page in italics. Synonyms are in italics.

HOSTS AND PREDATORS OF OGCODES

(The species name is followed by the generic name, in parentheses)

	Host	*Predator*	*Both host and predator*
Aelurillus, p. 239	X		
Agelenidae, pp. 238, 242	X		
Amaurobidae, p. 238	X		
Anyphaenella, pp. 239, 283	X		
Anyphaenidae, p. 238	X		
Aranaea, p. 238			X
banksi (Pardosa), pp. 239, 278	X		
barbipes (Tarentula), p. 239	X		
bitaeniata (Cosmophasis), p. 239	X		
Clubiona, p. 239	X		
Clubionidae, p. 238	X		
Cosmophasis, p. 239	X		
Crabro, pp. 269, 277, 306		X	
cunctator (Xysticus), pp. 239, 281, 302	X		
curta (Hololena), pp. 239, 292	X		
Dictyna, p. 243		X	
distincta (Pardosa), pp. 239, 278	X		
Ectemnius, pp. 243, 279, 306		X	
fasciata (Phlegra), p. 239	X		
ferus (Nabis), p. 243		X	
Gnaphosidae, p. 238	X		
Heliophanus, p. 239	X		
Herphyllus, pp. 239, 292	X		
Hololena, pp. 239, 292, 302	X		
insignitus (Aelurillus), p. 239	X		
kochi (Tarentula), p. 239, 281	X		
Labidognatha, p. 242			X
luctuosus (Xysticus), p. 239	X		
Lycosa, pp. 239, 291	X		
Lycosidae, pp. 238, 241, 242			X
Matachia, pp. 239, 257	X		
montanensis (Xysticus), pp. 239, 283, 291	X		
Nabis, p. 243		X	
Orthognatha, p. 242	X		
palomara (Steatoda), pp. 239, 291	X		
Pardosa, pp. 239, 243, 278, 291, 301, 302, 304			X
Philodromus, pp. 239, 302	X		
Phlegra, p. 239	X		
Prothesima, p. 239	X		
Psechridae, p. 238	X		
Pteromalidae, p. 243		X	
pullata (Lycosa), p. 239	X		
putris (Clubiona), p. 239	X		
ramulicola (Matachia), pp. 239, 257	X		
raphidid, p. 243		X	
reduviid, p. 243		X	
saltabunda (Anyphaenella), pp. 239, 283	X		
Salticidae, p. 238	X		
saxatilis (Pardosa), pp. 239, 291	X		
spiniferus (Ectemnius), p. 279		X	
Steatoda, pp. 239, 291	X		
sternalis (Pardosa), pp. 239, 278, 301, 302, 304	X		
Tarentula, pp. 239, 281	X		
Tetragnatha, p. 243		X	
Theridiidae, p. 238	X		
Thomosidae, p. 238			X
Trochosa, p. 239	X		
Walmus, pp. 239, 291	X		
Xysticus, pp. 239, 243, 281, 283, 291, 302			X
Zelotes, p. 239	X		

Appendix

It is unfortunate that I was unable to include in this revision the recent work on the Australian Acroceridae by Paramonov (1957). I was, however, able to include his new species in the list of world species on page 316, although I did not include his synonymical findings. A brief review of his work follows.

Paramonov recognized 4 genera, 29 species, and 1 variety of Australian acrocerids. Of these, 11 species and 1 variety were described as new. The genus *Ogcodes* (as *Oncodes*) comprised more than one-half of the article and included a key which distinguished 18 of the 22 recognized species. Altogether, 10 new species of *Ogcodes* were described: *armstrongi* (♀) *waterhousei* (♀), *wilsoni* (♂), *deserticola* (♂), *pusillus* (♂), *tenuipes* (♂), *hirtifrons* (♂♀), *canberranus* (♂), *glomerosus* (♂) and *lucidus* (♂). Judging from Paramonov's descriptions it seems probable that these new species belong to the following species groups as set forth earlier in my revision. In the *pallidipennis* group are *armstrongi*, *waterhousei*, *pusillus*, *deserticola*, and *wilsoni*. In the *colei* group are *tenuipes*, *canberranus*, *glomerosus*, and *lucidus*. The other new species, *hirtifrons*, very probably belongs to the new subgenus *Protogcodes*, which was described above from New Zealand. Also on the basis of Paramonov's paper it seems probable that *victoriensis* Brunetti, *insignis* Brunetti, and *variegatus* Brunetti belong in the *pallidipennis* group, and that *tasmanica* Westwood, *ignava* Westwood, *flavescens* White, and *fratellus* Brunetti (all of which Paramonov believed were synonyms of *fortnumi* Westwood) belong in the *colei* group. The positions of *nigrinervis* White, *doddi* Wandolleck, *castaneus* Brunetti, and *fumatus* Froggatt remain unknown.

For the most part Paramonov's descriptions are quite adequate; however, in several instances mention was made of the difficulty in finding structural differences between the species. For example, he described *wilsoni* and *deserticola* (both ♂♂) as new species closely related to *insignis* Brunetti, and stated under the latter (p. 538) that both of them were "extremely closely related to *insignis* and probably belong to it." Although certain color differences were noted, here is a case where an examination of the genitalia would very probably have solved the problem of specificity. Other than color, no mention was made for any species in regard to the male genitalia.

I have been able to examine three of Paramonov's species, all represented by type material: *armstrongi* (♀ only), *deserticola* (♂ only),

and *hirtifrons* (♀ only). *O. armstrongi* was described from three females and is closely related to *basalis* (Walker). However, when color differences show up in the female sex as strikingly as they do in *armstrongi*, chances are that the male sex, when known, will be easily distinguished from *basalis* (Walker). I examined the male genitalia of *deserticola* and although the species shows a relationship to *basalis* (Walker) it is quite distinct. The female specimen of *hirtifrons* that I examined did not have the basal antennal seta characteristic of *O.* (*Protogcodes*) *paramonovi*, new species, but other characteristics seem to agree with the latter; hence, I tentatively place *hirtifrons* in the new subgenus *Protogcodes*.

It is difficult to say whether any species of *Ogcodes* should be described from the female sex alone, particularly since most females of *Ogcodes* species throughout the world are difficult to distinguish, and as of now few structural characters are known that enable one to differentiate females of one species from another. Paramonov's new species *waterhousei*, described from a unique female, may be only a variant of *basalis* (Walker) or *armstrongi*. The main specific character noted for *waterhousei* was its darkened wings, a feature which has been shown to be rather unreliable after large series were examined (see discussion under *adaptatus*, new species (p. 299), and under *pallidipennis* Loew by Sabrosky, 1944).

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Plates 1–13

with

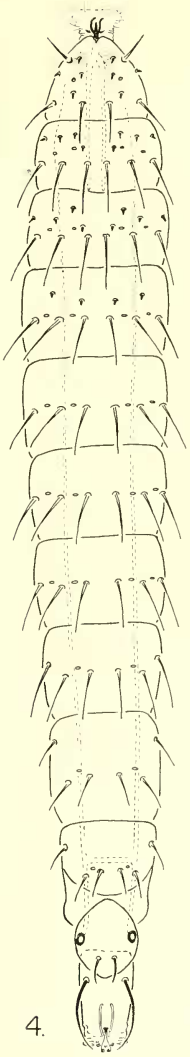
Plate-Figures 1–112

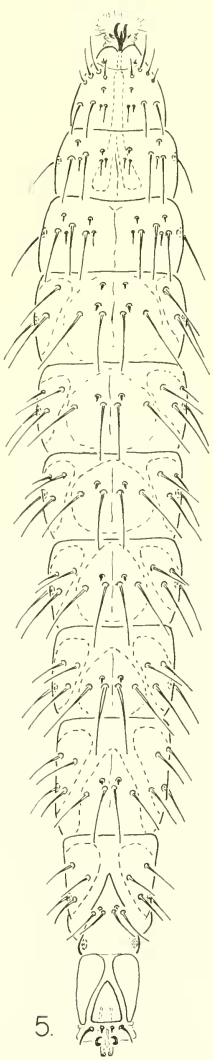
1.

2.

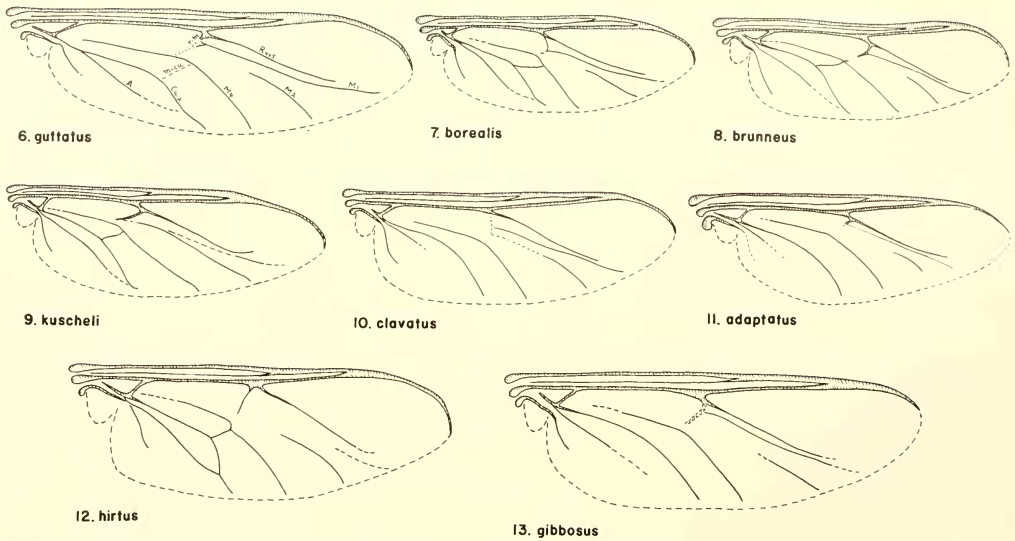
3.

FIGURES 1–3.—*Ogcodes adaptatus*, new species (Luther Pass, Calif.): 1, Pupa attached by head to spider host's premoulting web (below pupa is host skeleton, and at far right is parasite's meconium); 2, teneral adult (2 minutes old) with pupal skin below; 3, adult resting on its pupal skin (note obvious protruding mouthparts). [Photographs by Francis M. Summers.]

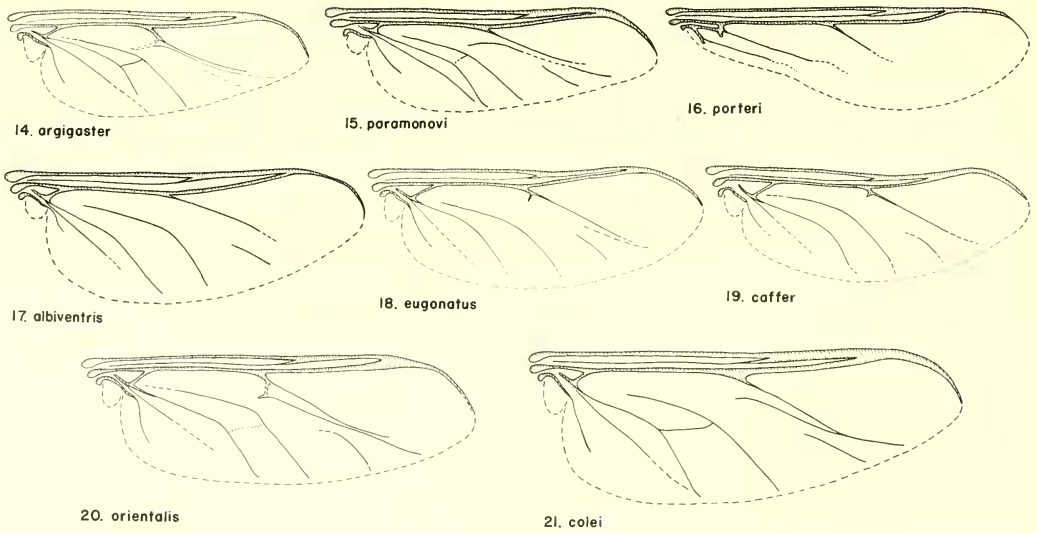




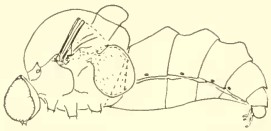
FIGURES 4–5.—First-instar larvae of *Ogcodes adaptatus*, new species (Sardine Creek, Calif., paratypes): 4, dorsal view; 5, ventral view. (Both larvae with heads at top.)



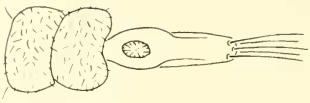
FIGURES 6–13.—Wings of *Ogcodes* species (6, Mt. Pelion, Greece; 7, Waterton Park, Canada; 8, Ohakune, New Zealand; 9, Masatierra, Juan Fernandez Islands, Chile, paratype; 10, Naivisha, Kenya; 11, Sardine Creek, Calif., paratype; 12, Sharaf Khanef, Iran; 13, Uckeritz-Usedom, Germany).



FIGURES 14–21.—Wings of *Ogcodes* species (14, Cass, New Zealand, paratype; 15, Ohakune, New Zealand, holotype; 16, Viña del Mar, Chile, holotype; 17, Muskegon, Mich.; 18, Morongo Valley, Calif.; 19, Milnerton, South Africa; 20, Angkor, Cambodia, holotype; 21, Mill Valley, Calif.).

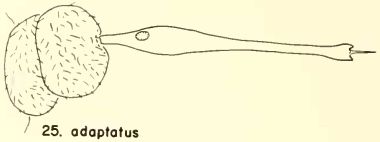


22. guttatus



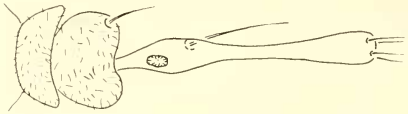
23. albiventris

24. adaptatus

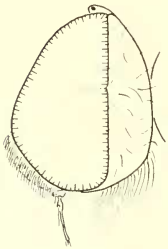


25. adaptatus

26. hirtus

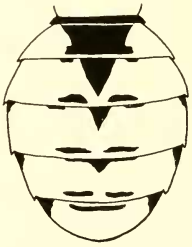


27. paramonavi



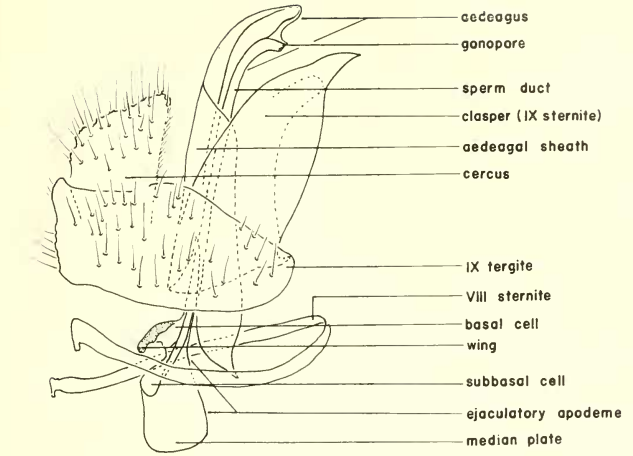
28. paramanovi

29. adaptatus

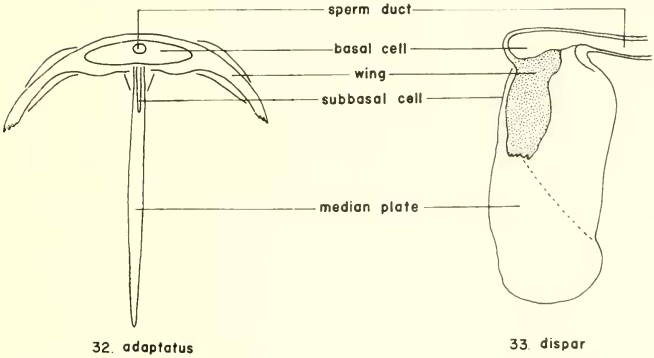


30. albiventris

FIGURES 22–30.—*Ogcodes* species: 22, 24, 26, with bodies in lateral view (22, Mt. Pelion, Greece; 24, Sardine Creek, Calif., paratype; 26, Sharaf Khanef, Iran); 23, *Neogcodes*, new subgenus (Livermore, Calif.); 25, subgenus *Ogcodes* (Sardine Creek, Calif., paratype); 27, *Protogcodes*, new subgenus, with antennae in lateral view (Ohakune, New Zealand, holotype); 28, head in lateral view (same); 29, 30, abdomens in dorsal view (29, Sardine Creek, Calif.; 30, Palo Alto, Calif.).



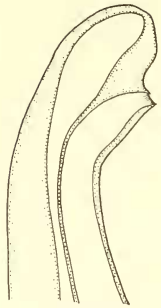
31. hirtus



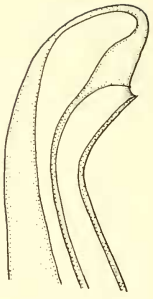
32. adaptatus

33. dispar

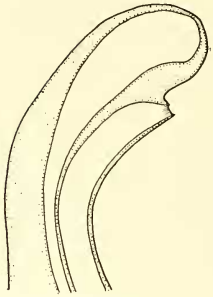
FIGURES 31–33.—Genitalia of *Ogcodes* species: 31, entire genital segments in lateral view, dorsum to the left (Sharaf Khanef, Iran); 32, ejaculatory apodeme in anterior view (Sardine Creek, Calif., paratype); 33, ejaculatory apodeme in lateral view (Du Bois, Ill.).



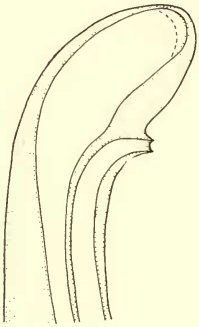
34. rufoabdominalis



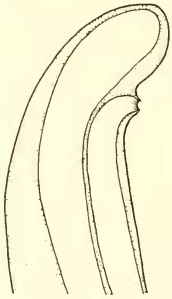
35. dispar



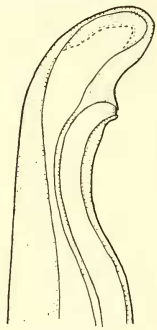
36. pallidipennis



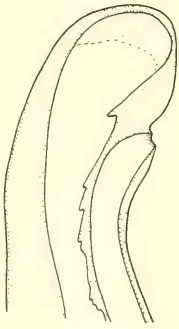
37. philippinensis



38. orientalis

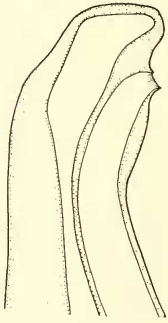


39. argentinensis



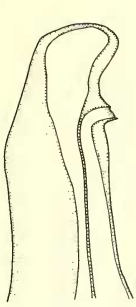
40. colombiensis

41. adaptatus

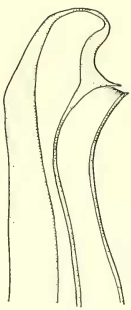


42. boharti

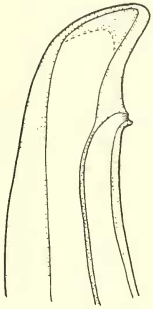
FIGURES 34–42.—*Ogcodes* species, with distal portion of aedeagi in lateral view (34, West Salt Lake, Utah; 35, Du Bois, Ill.; 36, Fond du Lac, Wis.; 37, Sibuyan Island, Philippine Islands, holotype; 38, Angkor, Cambodia, holotype; 39, Chascomus, Buenos Aires, Argentina, holotype; 40, Villeta, Cundinamarca, Colombia, holotype; 41, Sardine Creek, Calif., paratype; 42, Oak Creek Canyon, Ariz., holotype).



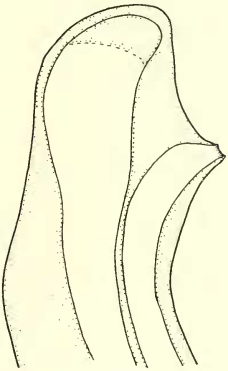
43. gibbosus



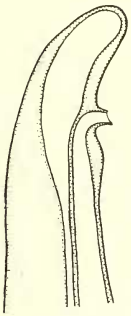
44. sabroskyi



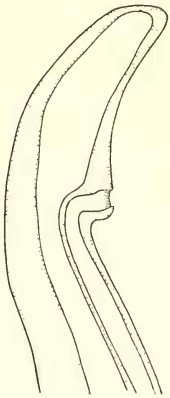
45. hennigi



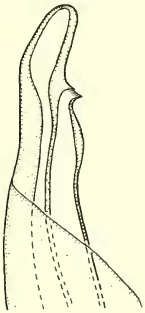
46. basalis



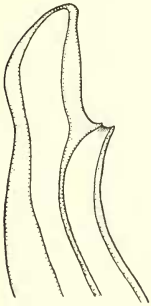
47. varius



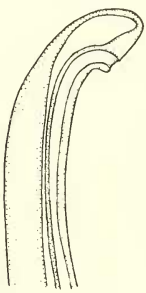
48. clavatus



49. canadensis

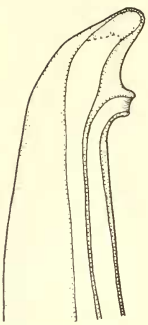


50. brasilensis

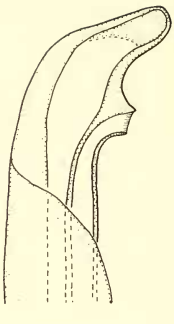


51. pallipes

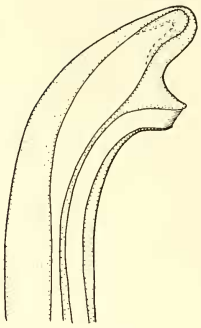
FIGURES 43–51.—*Ogcodes* species, with distal portion of aedeagi in lateral view (43, Potsdam, Germany; 44, Currahee Mountain, Ga., holotype; 45, Orient, N.Y., holotype; 46, Acacia Plateau, New South Wales, Australia; 47, Berlin, Germany; 48, Naivisha, Kenya; 49, Houghron, Ontario, Canada, holotype; 50, Nova Teutonia, Brazil, holotype; 51, Eyr's, Germany).



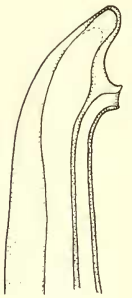
52. nitens



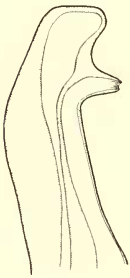
53. argigaster



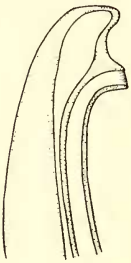
54. hirtus



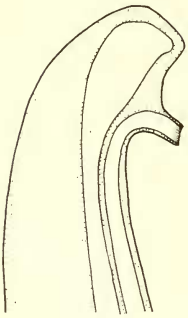
55. similis



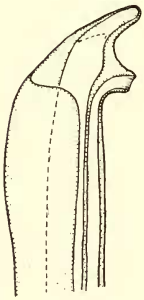
56. borealis



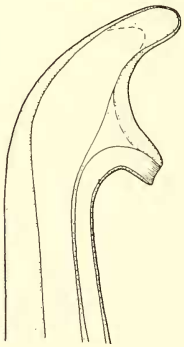
57. fortnumi



58. pygmaeus

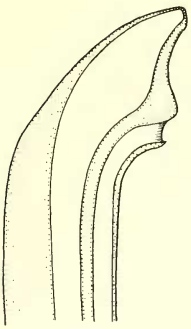


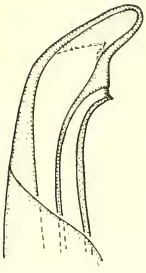
59. kuscheli

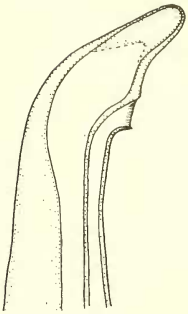


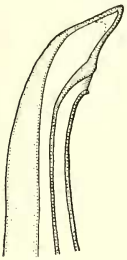
60. paramonovi

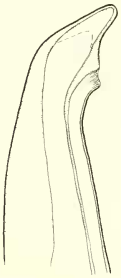
FIGURES 52–60.—*Ogcodes* species, with distal portion of aedeagi in lateral view (52, Port-hills, New Zealand; 53, Cass, New Zealand, holotype; 54, Sharaf Khanef, Iran; 55, New Zealand, holotype; 56, Drews Gap, Oreg.; 57, 58, Upper Blessington, Tasmania; 59, Masatierra, Juan Fernandez Islands, Chile, paratype; 60, Ohakune, New Zealand, holotype).

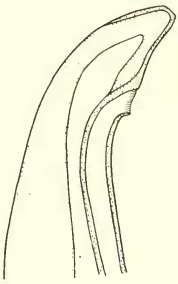

61. leptisoma

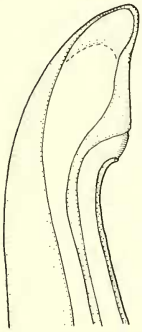

62. shewelli

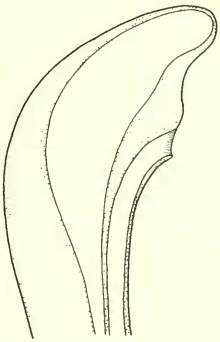

63. vittisternum

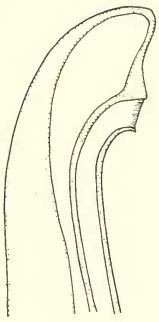

64. colei


65. albiventris

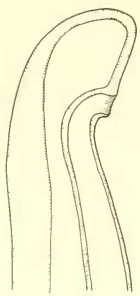

66. guttatus


67. consimilis

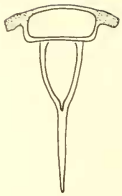

68. brunneus


69. caffer

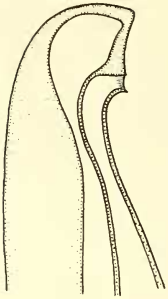
FIGURES 61–69.—*Ogcodes* species, with distal portion of aedeagi in lateral view (61, Queenstown, New Zealand, holotype; 62, Cold Springs Harbor, N.Y.; 63, Spokane, Wash.; 64 Clear Lake, Calif.; 65, Muskegon, Mich.; 66, Mount Pelion, Greece; 67, Blackhall, New Zealand; 68, Ohakune, New Zealand; 69, Matjesfontein, Cape Province, South Africa).



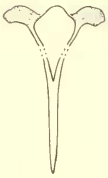
71. zonatus



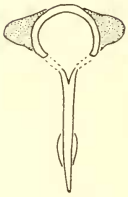
72. borealis



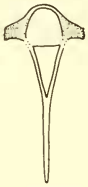
73. eugonatus



74. fortnumi

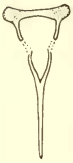


75. consimilis

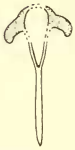


76. pallipes

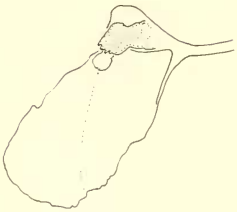
77. pygmaeus



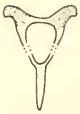
78. eugonatus



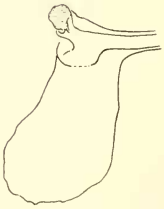
79. nitens



80. hennigi

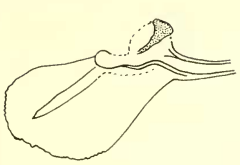


81. guttatus



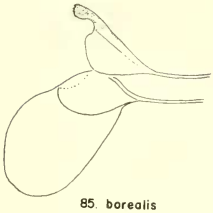
82. brunneus

FIGURES 71–82.—Genitalia of *Ogcodes* species: 71, 73, with aedeagi in lateral view (71, St. Moritz, Switzerland; 73, Morongo Valley, Calif.); 72, 74–79, 81, with ejaculatory apodemes in anterior view (72, Dane Co., Wis.; 74, 77, Upper Blessington, Tasmania; 75, Ohakune, New Zealand; 76, Maran's, France; 78, Mill Creek, San Bernardino Co., Calif.; 79, Porthills, New Zealand; 81, Mount Pelion, Greece); 80, 82, ejaculatory apodemes in lateral view (80, Orient, N.Y., holotype; 82, Ohakune, New Zealand).



83. consimilis

84. fortnumi

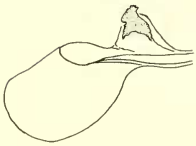


85. borealis

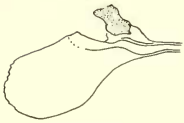
86. pallipes

87. similis

88. kuscheli



89. argigaster



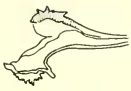
90. nitens

91. guttatus

92. albiventris

93. coffer

94. eugonatus



95. leptisama

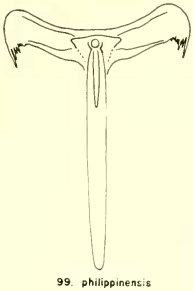
96. vittisternum

97. shewelli

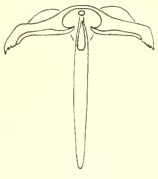
98. colei

FIGURES 83–98.—*Ogcodes* species, with ejaculatory apodemes in lateral view (83, Ohakune, New Zealand; 84, Upper Blessington, Tasmania; 85, Drews Gap, Oreg.; 86, Eyr's, Germany; 87, New Zealand, holotype; 88, Masatierra, Juan Fernandez Islands, Chile, paratype; 89, Cass, New Zealand, holotype; 90, Porthills, New Zealand; 91, Mount Pelion, Greece; 92, Muskegon, Mich.; 93, Matjesfontein, Cape Province, South Africa; 94, Morongo Valley, Calif.; 95, Queenstown, New Zealand, holotype; 96, Spokane, Wash.; 97, Cold Spring Harbor, N.Y.; 98, Mill Valley, Calif.).

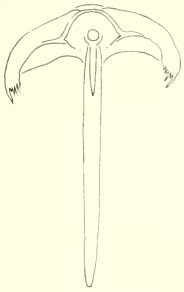
FIGURES 99–112.—*Ogcodes* species, with ejaculatory apodemes in anterior view (99, Sibuyan Island, Philippine Islands, holotype; 100, Orient, N.Y., holotype; 101, Acacia Plateau, New South Wales, Australia; 102, Eastham, Mass.; 103, Chascomus, Buenos Aires, Argentina, holotype; 104, Oak Creek Canyon, Ariz., paratype; 105, Houghron, Ontario, Canada, holotype; 106, Nova Teutonia, Brazil, holotype; 107, Currahee Mountain, Stephens Co., Ga., paratype; 108, Villeta, Cundinamarca, Colombia, holotype; 109, Budapest, Hungary; 110, Naivisha, Kenya; 111, Potsdam, Germany; 112, Angkor, Camdodia, holotype).



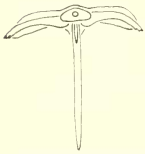
99. philippinensis



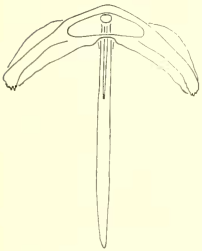
100. hennigi



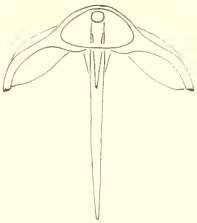
101. basalis



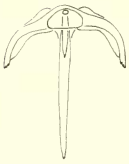
103. argentinensis



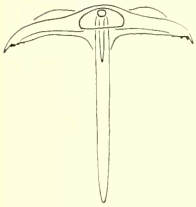
102. pallidipennis



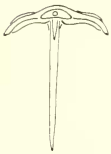
104 baharti



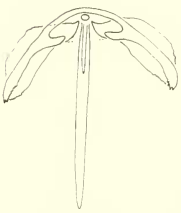
105. canadensis



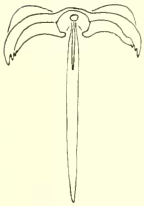
106. brasilensis



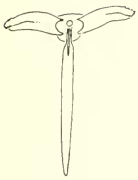
107 sabroskyi



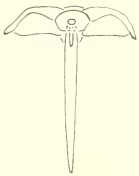
108. columbiensis



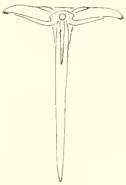
109. varius



110. clavatus



111. gibbosus



112. orientalis

FIGURES 99–112.—Explanation on facing page.

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